Pests

AND THEIR CONTROL

1947
MAY
VOL. 15, NO. 5

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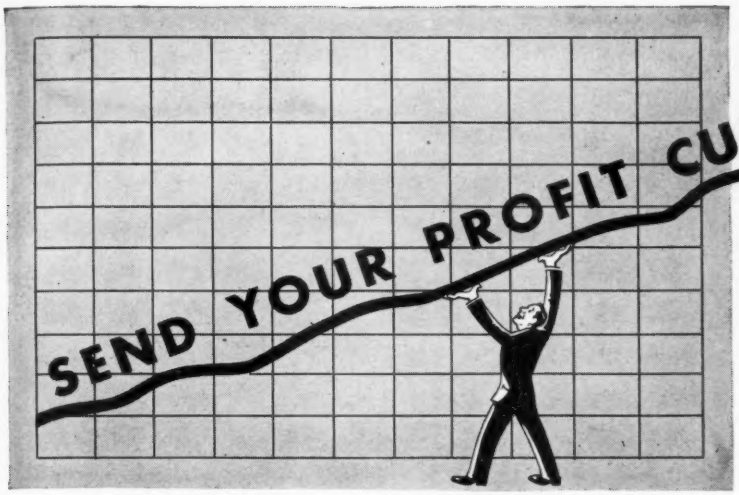

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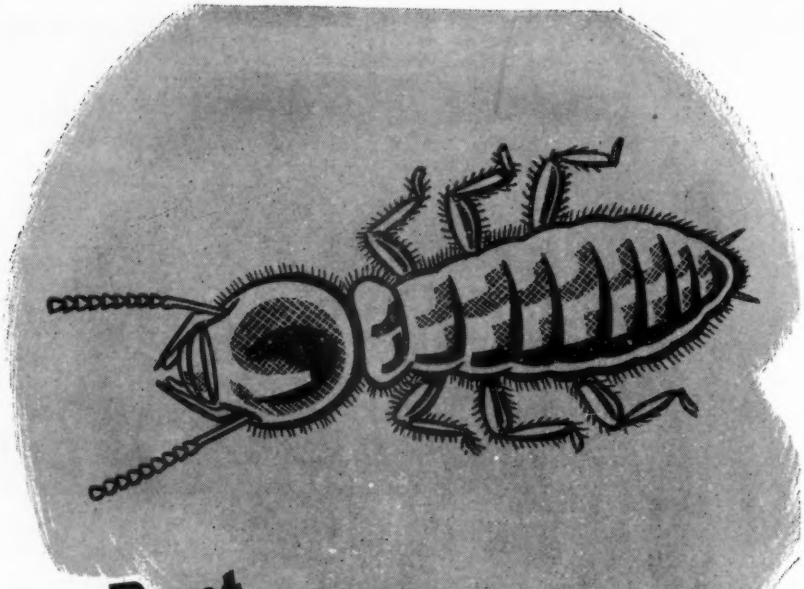

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"Contributed articles in this publication do not necessarily reflect the opinions of the editors. The editors invite discussions, comments and all types of literary material pertaining to pest control and pests from any person interested in the advancement of the field."

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EDITORIAL

M. A. (Sandy) Sanderson

In the untimely passing of M. A. (Sandy) Sanderson, Reliable Exterminators, Ltd., Toronto, on April 16, as a result of a heart condition, the industry has lost one of its colorful and articulate personalities. He was making arrangements to attend the Purdue Conference with his son, Don, when stricken.

Mr. Sanderson, or "Sandy" as most preferred to call him, was a staunch believer in the inherent dignity of his chosen profession and of its basic worth in the public interest, and he never stopped telling the world about it. If he was strongly individualistic in promoting his business, he was unfailingly co-operative in association affairs. Not only was he a veteran of World War 1, but he was a member of both the National Pest Control Association and the Canadian PCO Association, serving as a regional vice president of the latter.

His loss will be felt and he will be greatly missed. His good family, comprising Mrs. Sanderson and his son, has the sincere sympathy of all who had the pleasure of knowing "Sandy", throughout his life.

Taking Advantage of Opportunity

FOLLOWING up the editorial which appeared in the April issue, entitled "Our Profession and a National Sanitation Week", we are presenting more facts and evidence as to why our industry should take advantage of the challenging opportunity presented by all the health publicity now being given through newspapers, magazines and the radio.

The **Womans Home Companion**, a magazine with a circulation of over 3,690,000, published an article in the 1946 December issue entitled "Disease a la Carte". One of the pertinent questions asked is, "Are You one of the 65 Million Americans Who Eat or Drink in Public Eating Places? If so, this Article Vitally Concerns You". At the close of the article, it reads, "Can you Use Reprints of This Page? To help you convince others of the urgent need for doing something, we will be glad to send limited quantities of reprints of this page".

This is but one article among many, yet it illustrates how the tremendous importance of the "health angle" is being brought to the attention of the people through the press. This matter of health is a subject of great importance and vitally concerns the public. It is for this reason that health officials are disturbed over certain deplorable conditions existing in many public eating houses and are taking steps to correct and control them.

The public at present is being made "health conscious" as never before through the vast publicity about unsanitary conditions existing throughout the country. There is no better time than now to re-emphasize the paramount importance and need of our industry. Its valuable service to mankind in controlling and eliminating disease and sickness, important to the health and mental comfort of every one, should be stressed as never before. Without the service of our profession there is no question but that the unsanitary conditions would be much worse than at present.

Let us remember that nothing in nature stands still. Institutions also will either grow or they will die. What PCO's desire for the future is the growth and development of the industry and of the NPCA. Our industry cannot stand still, if it does it will cease growing and die.

PCO's and Sanitary Control

During the war we learned many things and we are still learning things since V-J Day. One thing that has been most forcibly impressed upon the minds of all Pest Control Operators of late, is the supreme importance of new chemicals in pest control service as well as the profound significance of the relationship between Pest Control Operators and Public Health.

Never before has our industry and the NPCA experienced such an awakening realization of the paramount need of sanitary control in food plants and other kindred industries as exists today. More and more PCO's are beginning to realize the significance of this relationship.

With these new chemicals, our industry now is able to enter new fields never dreamed or thought of before. It is surprising to note the various fields the PCO's are now in a position to service.

It is no wonder that Prof. J. J. Davis of Purdue University, as well as others has emphasized and re-emphasized that there is no need for PCO's to be alarmed or fear that the pest control business is or will be withering away. The potentialities for PCO's entering new fields for new business are amazing and beyond our ability to fathom their possibilities.

One needs only read just a few back issues of **Pests** to learn a few of the new fields that PCO's are entering to service. Elsewhere in this issue is an article on "Fly Proofing", another field for PCO's to secure new business. No doubt as time goes on, there will be new suggestions offered to PCO's for rendering service in newer fields.

EXPRESS YOUR VIEWS

Commends Powell Co.

To Pests Magazine, N. Y.:

Through an inadvertence on my part you were unacquainted with the fact that John Powell & Co., an active associate member, ably served by their Mr. John Stoddard, made possible Dr. Munch's appearing at the March meeting of the Professional Exterminators Association in N. Y., story of which appeared on page 26 of April Pests. We are cognizant of the fact that Dr. Munch's talk helped to make our evening the success it was and we would be grateful if it could appear for the records that this industry-minded company acted with an attitude over and above the necessity that the sale of their various products ordinarily entails.

We were so pleased with the description of the meeting that we think the author rates a by-line and hope in the future his name will appear with his articles.

Professional Exterminators Ass'n. (N. Y.)
Joseph Finneman, President

Thanks, Joe, for your tactful reminder about the John Powell Co., and we offer our apologies for the unintentional (and we don't have to assure you) oversight. Glad you liked the story. As for the By-Line plug, we'll bet you tell that to all the reporters. But seriously I do appreciate your thoughtfulness in suggesting it. M. R.

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The Use of the Rodenticides 1080 and ANTU [1/]

S. W. SIMMONS and H. P. NICHOLSON
United States Public Health Service

AS a result of research carried on in the United States during World War II, pest control operators now have available two rodenticides which, when used properly, effect control of domestic rodent pests to a degree and with a consistency never before achieved. The rodenticides referred to are 1080, chemically known as sodium fluoroacetate, and ANTU, or alpha naphthylthiourea.

Neither of these rodenticides is a panacea with which the layman can expect to produce consistently satisfactory results. As was the case with the insecticide, DDT, these new rodenticides have been widely publicized leading the general public to expect miracles from their use. This situation has, of course, resulted in disappointment in some cases.

Stemming from this build-up has been a clamor on the part of the public for access to the rodenticides. ANTU has been released for public use, but the sale of 1080 has been restricted upon the recommendation of those agencies concerned with its development and by general agreement of the manufacturers and certified pest control operators, Governmental agencies, and other research groups. In addition, pest control operators have been urged not to sell 1080 or baits or mixtures containing 1080 to the public.

To secure consistently satisfactory results and in order to prevent the accidental poisoning of humans, pets and live stock, both 1080 and ANTU should be applied by men whose training or experience qualifies them in the field of rodent control. These men should possess a thorough knowledge of the habits of rats and mice and of the characteristics and limitations of the rodenticides being used.

Among rodenticides at present available, 1080 is undoubtedly the most effective rat-killing agent. It is highly toxic to all species of domestic rats in this country as well as to mice. Its median lethal toxicity to Norway rats has been found by Dieke and Richter (1), to be 0.22 milligrams per kilogram of body weight. An MLD of 3 mg/kg is reported in the same paper as the finding of the Fish and Wildlife Service, U. S. Department of Interior. The MLD for Alexandrine and roof rats has been found to be even lower than for the Norway rat (2). It is also very effective against mice, when used in water solution and dispersed in squat containers, no taller than a mouse's head. When prepared for use in solution at the recommended dosage of 12 to 14 grams per gallon of water, 90 per cent or more control of rats can consistently be achieved, provided that application is properly made.

An important factor contributing to the success of 1080 is its acceptance by rats and mice. It has no objectionable odor or taste, and some investigators claim that rats accept it in water solution in preference to pure water. Certainly the repellent effect, if present, is exceedingly slight.

An important quality of 1080 is its relatively quick action in comparison with other rodenticides. When used in the recommended dosage, rats die within one to several hours after taking a lethal amount. Since the first symptoms of illness usually immobilize them, dead rats are frequently found in the open near the poison cups where they may be picked up and destroyed. The likelihood of odors developing in inaccessible places is thus minimized. Since death occurs over such a short span of time, all odors that develop usually appear within a few days after poisoning. Tolerance of a significant degree is not developed under practical conditions on the ingestion of the sub-lethal amounts, so that 1080 poisoning may be repeated satisfactorily. Rats apparently develop only slight, if any, aversion to 1080 solution, although they probably learn to avoid a particular type of solution container if used repeatedly over a short period of time in a single establishment. This reaction may be overcome by refraining from using 1080 solution for an adequate period of time following its first use or perhaps changing the type of solution container.

Not the least important of the desirable characteristics of 1080 is its cost. At the present time, the price is about $8.00 per pound. In spite of this seemingly high price, it is perhaps the most economical of our present day rodenticides, both from the viewpoint of the results obtained and the cost per bait. This is obvious when it is considered that from one pound of 1080, 32 to 37 gallons of poison solution can be prepared at a cost of about 20 to 25 cents per gallon. If this solution is dispersed in ½ oz. quantities, 256 baits can be obtained from a gallon of fluid, or 10 to 13 for every cent of the original price.

Although 1080 is undoubtedly the outstanding rodenticide available at present, it does possess a number of undesirable characteristics. The rapidity of absorption in the gastro-intestinal tract, the extreme toxicity, the fact that it is a white powder without odor and with only a slight taste, and danger of secondary poisoning constitute serious hazards from the standpoint of accidental poisoning of man and animals. At present, there is no specific therapy in case of accidental poisoning, and retention of a lethal quantity for only a short time will result in death.

In view of the above mentioned hazards, a number of recommendations have been made by the U. S. Public Health Service concerning the use of 1080 in rat control.

First, 1080 solution is recommended for use in business establishments only, where the danger of poisoning humans is at a minimum and where conditions can be strictly controlled. Under no circumstances should 1080 be used in homes. The accidental death of two children, supposedly from 1080 poisoning, have already been reported. At least one of these deaths was associated with the injudicious use of 1080 solution in a home.

Second, the solution should be dispensed in small quantities in containers such as ½ oz. souffle cups. These cups should always be placed in such a position as to avoid contamination of food if accidentally tipped over, and should be recovered on the following day. The remaining 1080 solution should be flushed down a sanitary drain and the cups destroyed by burning or burying deeply. It is important that individual doses be kept small, since only a cubic centimeter of solution, which can be taken in a few laps of the tongue, is required to kill the largest rat. It is recommended that the containers not be used a second time, unless they are glass or

1- From Communicable Disease Center, Technical Development Division, Savannah, Ga.

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of such other material that can be cleaned by washing, as the contents would be rendered more potent to children, due to the crystallized deposit remaining from the first use.

Third, all recovered dead rats should be incinerated or buried deeply to prevent possible secondary poisoning of valuable animals. These rats should not be deposited in garbage as such waste may be delivered to hog farms as feed.

Fourth, 1080 should be used only in water solution and at dosages not to exceed 14 grams per gallon. When used in solid baits these baits are difficult to recover and may be eventually eaten by valuable cats or dogs or find their way into garbage which may be fed to hogs. A case is on record where 50 hogs were lost because they were fed city garbage into which solid bait containing 1080 had been thrown.

ANTU, the second of our two recently developed rodenticides, is characterized chiefly by its high toxicity to Norway rats (6.9 milligrams per kilogram of body weight (1) and its apparently low toxicity to humans and certain other species. This is in one sense a great advantage since it provides a highly potent, readily acceptable agent which is perhaps safer to use than most other rodenticides with the exception of red squill.

On the other hand, ANTU is specific for Norway rats. The black and Alexandrine rats possess a natural tolerance which in most cases provides protection against practical dosages. It is not recommended for use against the latter two species or against house mice.

ANTU has been used with outstanding results by Richter and his associates (3) (4) in a city-wide rat control campaign extending over a period of 3 years in Baltimore, Md. Its safety and efficiency when used properly against Norway rats has been adequately demonstrated.

Several factors in addition to its specificity to Norway rats limit the usefulness of ANTU and must be understood by the pest control operator and the general public to avoid disappointment following its application. These factors include: (1) the relative high degree of natural immunity possessed by immature Norway rats; (2) the development of tolerance in the Norway rat in a matter of a few hours after exposure to a sub-lethal dose; this tolerance offers protection against a subsequent normally lethal amount for at least a month, and often longer; and (3) the aversion against baits containing ANTU, developed after initial use. This aversion may last for several months and thus it is ill advised to use ANTU repeatedly, at short intervals, and in the same establishment.

There are several recommended methods by which ANTU may be used. These are described below:

1. Thoroughly mix with yellow corn meal in the proportion of 2 to 3 parts of ANTU to 100 parts of meal, and distribute in small piles.
2. Dust on diced apples, sweet potatoes, tomatoes, cantaloupe, watermelon, ground meat, fish or chicken heads.
3. Mix with an inert dust in the proportion of 20 per cent ANTU and apply liberally to rat runways from shaker cans. Also pump the dust into rat burrows and enclosed harborage areas with a **Cyanogas Foot Pump** duster or other suitable type of dust gun.

When ANTU is applied as a 20 per cent dust in an inert diluent, the poison is picked up on the feet, tail and fur of the rat and transferred to the mouth during the normal process of preening. The addition of 10 per cent DDT in the mixture will serve to kill rat fleas which are normally present on rats and in the burrows and harborages throughout the year, and are especially prevalent during the warmer months. Fleas leave dead rats and seek other available hosts on which to feed,including man, but the use of an ANTU-DDT combination dust minimizes this annoyance, and also eliminates potentially typhus-infected fleas. This is of particular significance in the Southern States.

By the judicious use of ANTU, ninety per cent or greater control of Norway rats has been reported. Dusting, however, is usually best accompanied by parallel baiting activities. On the average only 50 to 60 per cent control of Norway rats results following the use of this technique. Besides this relatively low degree of kill, the present price of ANTU ($4.00 to $4.25 a pound) limits the desirability of this method purely as a means of rat control.

ANTU is a relatively slow acting poison. Kills occur over a period of a few hours to three days, with most rats dying within the first 24 hours. Odors following the use of ANTU are frequent.

Although there is apparently no great danger of poisoning pigeons, rabbits, squirrels, and adult chickens by the judicious use of ANTU, it should be remembered that it is toxic to dogs as it is to Norway rats, and baby chicks have been readily killed by its use. Cats and pigs are also susceptible. Cats and dogs are possibly slightly protected by their ability to vomit and the apparent emetic effect of ANTU upon them.

The commercial users of 1080 and ANTU have a public responsibility to exercise every precaution that will contribute to safety. The judicious use of these materials, however, can render a real public service, and at the same time be an asset to the business and reputation of the pest control operator.

REFERENCES

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Insect Repellancy Standard Is Promulgated

A proposed commercial standard for woven and knitted fabrics and yarns treated to resist insect attack has been distributed, for review to the industries concerned by the U. S. Dept. of Commerce, National Bureau of Standards, so that, if necessary it may be adjusted to meet the composite viewpoint of key organizations. The proposed standard was submitted by the American Association of Textile Chemists and Colorists in collaboration with the American Society for Testing Materials and the National Association of Insecticide and Disinfectant Manufacturers, Inc., and is the result of combined intensive investigations by committees of these three organizations over a period of several years.

Purpose of the commercial standard is to establish minimum requirements on a nationally recognized basis for those woven and knitted fabrics and yarns which have been treated in any way to resist attack from certain insect pests, namely, the case-bearing clothes moth (Tinea pellionella), webbing clothes moths (Tineola biselliella), tapestry moth (Trichophaga tapetzella), common carpet beetle (Anthrenus scrophulariae), furniture carpet beetle (Anthrenus vorax), varied carpet beetle (Anthrenus verbasci), and black carpet beetle (Attagenus Piceus), as a protection to the manufacturers, distributors, and ultimate consumers; to promote fair competition between manufacturers; and to serve as a basis for guaranteeing quality.

The commercial standard covers the following five classes of resistance to insect attack, depending on the service expected from fabrics and yarns so treated: (1) treated fabrics and yarns, (2) treated fabric and yarns—aged, (3) treated fabrics and yarns—aged and laundered, (4) treated fabrics and yarns—aged and cleaned, (5) treated fabrics and yarns—aged, laundered and cleaned. It includes for each class requirements to be met to permit a treated fabric or yarn to be labeled or otherwise described as complying with the requirements of this standard, methods of test, and the recommended wording by which manufacturers and distributors may guarantee compliance with the commercial standard.

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TERMITE CONTROL - 1947 MODEL

NEELY TURNER, Conn. Agr. Expt. Sta., New Haven Conn.

THE eastern subterranean termite has been recognized as an economic pest since its damage to a building in Cambridge, Massachusetts in 1876 (Hagen, 1876). Until about 1930, however, serious termite damage was supposed to be confined to the tropics and the deep South. The occasional records of damage to buildings in the Northeast were certainly not extensive enough to warrant any great concern. The "outbreak" of 1930 to 1936 changed all this. Instead of occasional buildings slightly damaged and a matter of curiosity, literally hundreds of infested buildings were found in this area. It is commonly accepted among entomologists that insects vary in abundance because of variations in temperature, rainfall, abundance of parasites and other factors of the environment. To date no one has explained definitely which of these factors is involved in the ups and downs of termites. One explanation which does seem likely is the change in architecture which occured about 1916. In this area buildings were constructed much closer to grade level, and most important the wooden porches and steps were replaced by filled masonry porches, terraces and steps. In one respect such a change sounds good, there is less wood in contact with the ground, Actually, however, instead of discouraging termites, the filled porch invited termites directly into the sills. These porches and terraces are responsible for about four-fifths of the termite infestations in houses.

In spite of the presence of hundreds of susceptible buildings, the number of infested buildings reported declined sharply in 1937 and stayed at a low level until 1946, when a decided increase occured. This increase may have been a logical consequence of the building boom of the late thirties. However, few of the 1946 infestations were found in such recently constructed houses. At the Eastern Pest Control Operators Conference held here in 1941, I forecasted another "wave" of termite cases about 1950, as a logical consequence of the construction of thousands of susceptible buildings (Turner, 1941). If this estimate is correct, the demand for control operations should increase in the near future.

Biological Background

The control of any insect pest or prevention of damage by it is usually based on the biology of the pest. Termites have been studied carefully, and there is enough information on their life history and habits to enable us to apply prevention and control intelligently. Fortunately only subterranean species are found in the northeastern states and this discussion will be confined to this type.

The principal biological factors affecting the application of control are as follows:

(1) **The colony** is not a compact unit, but may be spread over a relatively large area with several reproductive centers connected by a network of runways. Colony location may be changed with changes in temperature, moisture and food supply.

(2) **Moisture** must be available in the form of moist soil or wood. Termites require relatively large amounts of moisture to keep the humidity in the runways at a high level, and they cannot survive without a high humidity.

(3) **The food** of termites is any cellulose-bearing material, usually wood or wood products.

(4) **Temperature** has a great deal to do with termite activity. Observations indicate that more damage is done to heated than to unheated buildings. Further, in one location the presence of a central heating plant with many underground steam lines has created "semi-tropical" conditions resulting in very heavy damage to unprotected buildings.

(5) **Grooming**, the habit of obtaining exudations from the bodies of termites, is common. Bv this means poisonous dusts are carried through a colony of dry-wood termites. In some cases termites will eat weaker members in their own colony, further aiding the spread of poisons from one insect to another.

(6) **The tube-building** habits of termites are very important. Shelter tubes may be constructed over impenetrable objects, such as masonry and untreated or even treated wood. Holway (1941) has investigated tube-building habits in the field and laboratory. He concludes that termites rarely build tubes up over foundations to infest the building above. This sort of tubing is stimulated by a very high population of termites in a restricted area. Most of the tubes seen on foundations were obviously constructed down from infested wood to the ground.

Control of Termites

It is now commonly accepted that direct control of the eastern subterranean termite is difficult, and that such methods as spraying, baiting, dusting the tunnels, trapping and fumigation of buildings have not in the past provided adequate control.

The one "weak point" in the habits of termites is the necessity for quantities of moisture, and the fact that this moisture is usually obtained from the soil outside the building. **Therefore the one basic principle for control of termites is to break all contacts, either direct or indirect, between wooden parts of the building and the ground and to remove any other sources of moisture from leaks, condensation, etc.**

Since this fundamental principle is generally accepted by entomologists and pest control operators alike, it should not be necessary to spend any time discussing it. However, each infested building must be considered as an individual case requiring individual attention. For this reason it seems advisable to consider a procedure which may be followed in termite control. Such a procedure should consider the following points: (1) the places at which the termites have actually entered the building, (2) susceptible places which have not been infested, (3) the type of construction of the building and (4) the quality of construction in relation to termite entry.

Points of Entry

Termites usually enter the wood of the building at a point where wood is in actual contact with the ground or in rare instances through voids in foundations to enter the wood above. In the ordinary open basement the places to be examined are (1) the sills adjoining porches, steps and terraces, (2) wooden basement window frames at or near the grade level, (3) wooden bearing posts, basement stairs, coal bin partitions and the like set in the basement floor and (4) wooden cellar hatchways and outside doors. Since house construction is not standard, there are many variations, including unexcavated or partly excavated areas. Frequently also the basement has a ceiling which prevents examination of the sills, and occasionally the outside basement walls and floors are finished to make a game room. Any wood in the walls and floors of such basement rooms must be assumed to be susceptible to termite entry.

Business buildings differ from dwellings in type of construction. However, wooden store fronts frequently offer the same problem as masonry porches, and wooden door casings in garages and factories usu-

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ally extended into concrete and frequently actually into the ground.

It would seem advisable to make a rough sketch of the ground plan of each infested building, marking all infested spots as well as all susceptible spots.

Type of Construction

Under this category should be considered the height of the first floor above grade, the materials used in construction of the walls, the type of foundation (that is, complete foundation or piers). It should be borne in mind that many older factory buildings have a partially excavated area under the first floor.

Quality of Construction

The quality of construction in reference to termite entry is mostly a matter of foundation construction. Solid concrete walls offer the most resistance, solid unit masonry (stone or brick) next and hollow unit masonry (concrete blocks) the least. Many old houses have what appears to be a solid stone foundation, but actually there is no mortar between the stones and termites can wander in and out at will. The use of hollow concrete blocks is not in itself bad building practices, but unless the foundations are very tightly capped the hollows may lead the termites up into the sill. If the foundation is of uncapped hollow concrete blocks, the entire sill of the house must be considered as a possible point of entry.

Breaking Points of Contact

Having determined the points of termite entry, the next step is to break these points of contact. For wooden basement posts, stairways and partitions, this entails cutting off about four inches of the wood next to the basement floor and replacing it with a concrete footing. For wooden basement windows replacement with metal or construction of a well large enough to keep the soil away from the window frame is required. For terraces the NPCA Termite Committee has specified an observation tunnel which breaks the contact, allows thorough soil treatment and provides access for future inspection. (See PESTS 12(5) 1944). For houses at or below grade level regrading or use of a dry moat or well is needed. Susceptible wooden hatchways may be replaced with metal or rebuilt on suitable concrete foundations. Furnished basements should be rebuilt so that no wood is used below the top of the foundation, and no vertical voids lead up to the wood above.

If we carry the breaking of points to its logical conclusion something should be done about porous foundations. This means either capping or use of a termite shield. Whether this it done or not is likely to depend on the owner of the property rather than on the actual necessity for it.

Chemical Treatment

Having broken the contacts between the wood and the soil, the next step is the use of chemical treatment of the soil itself. In fact the chemical treatment may well be started as alterations are taking place. It is advisable to treat the soil underneath infested wood set in the concrete floor **before** footings are constructed to support the wood. The principle treatment is of course made after structural changes have been completed.

The NPCA specifications state: "An effective toxic chemical shall be applied, by entrenching and loosening of the soil around all walls, piers, chimneys, pipes, and the bases of heating units and any other contacts the house has with the soil." In addition, chemicals are to be used in porous foundations, hollow piers and hollow chimneys.

Factors Affecting the Performance of Soil Treatment

Chemicals used for treatment of the soil to prevent termite entry may be classified as (1) fumigants, such as orthodichlorobenzene; (2) poisons, such as the arsenicals, (3) contact insecticides, such as, pentachlorophenol and (4) repellents, such as coal-tar creosote.

Fumigants are most affected by the texture of the soil, the soil temperature and the amount of soil moisture. Most fumigants are most effective at higher temperatures, and they move most freely through coarse sandy soil. More compact soil and clay may be penetrated very poorly, especially if the moisture content is high. Conversely fumigants disappear most rapidly from sandy soils, especially from the surface layer. (See Hockenyos 1940a), In general, fumigants have been very unsatisfactory in New England.

Most of the information on action of arsenicals in the soil has been obtained by Hockenyos (1940b). In his investigations the following facts were established:

(1) To saturate a cubic foot of soil with treating fluid, an average of 40 pounds or between 4 and 5 gallons were required.

(2) Soaps and wetting agents did not increase the rate of percolation through the soil.

(3) Lateral diffusion of soil poisons is probably very small.

(4) Clays absorb about two-thirds of the soluble arsenate added, and each subsequent leaching removes a smaller amount than the preceding one.

(5) Drying treated soil concentrated the arsenate at the surface of the soil.

(6) Soluble arsenates were more effective than insoluble arsenates.

(7) The minimum effective concentration of sodium arsenates in a silt loam surface soil was about one pound in two to four cubic feet of soil.

Hockenyos (1939) has also studied the leaching of sodium arsenite in various soils. Apparently the heavier soils held the arsenite better than sandy soils. Lateral diffusion was greatest in the sandy soils.

Information on the factors affecting repellents and contact insecticides is most fragmentary. However, Hockenyos (1940a) did note that water displaced most such chemicals rather easily. He also states (1940c) that termites do not penetrate soil in which the odor of such chemicals as beta naphthol and creosote persist.

Treating Materials

Strange as it may seem, there is very little information on arsenical treating materials. It seems to be accepted that soluble arsenicals are among the most effective materials. Creosote is of known value and orthodichlorobenzene has been very effective in some regions.

Among the newer chemicals pentachlorophenol dissolved in oil seems to be a very effective material. Anderson (1943) suggested its effectiveness but gave no data. Hatfield (1944) found it among the best materials. Trichlorobenzene was not so effective but a mixture of the two was good. Christian (1945) found that a 5 per cent pentachlorophenol in oil at the rate of one gallon in ten linear feet prevented termites from crossing the treated trench for four years. Sodium tetrachlorophenate used at two pounds in ten linear feet was about 90 per cent effective in four years. Diphenylamine was reported highly effective by Smith (1939).

Treating Methods

There is very little technical information in the literature about methods of applying soil treatment. Farmer's Bulletin 1911 specifies a barrier from 8 to 12 inches wide, deep enough to cover all possible points of termite entry. Specifically the trench should be at least 30 inches deep but not below footings with bar holes every 12 to 18 inches "if necessary". For such chemicals as sodium arsenite and coal-tar creosote, trenching and filling seems to be most effective. For orthodichlorobenzene in sandy soils, the bar-hole method has worked.

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Hockenyos (1940c) has said: "There is an element of chance in every application of soil poison where a basement or cellar excavation is involved unless the soil is completely excavated and poisoned as it is back-filled." Hatfield (1944) compared the two methods in field tests of chemicals and inferred that shallow trenching was much less effective than mixing the chemical with the soil. However, he presented no data. Hockenyos (1940c) summarized the problem most aptly when he said: "Whoever first expressed the axiom that 'No termite job can be done thoroughly enough' may be said to have preached a whole sermon in one sentence."

Treating Wood in Buildings

The NPCA Termite Committee has included a statement to the effect that impregnation of damaged but structurally safe timbers would be an additional benefit to other chemical treatment. This subject has been almost as controversial as the adequacy of termite shields, with state and federal entomologists and wood-treating experts on one side and commercial termite control companies on the other with little common ground in between. Farmers' Bulletin 1911 is specific in "not recommending" treatment of timbers in place. Brown (1936) rather guardedly endorsed pressure treatment through holes drilled in the wood and use of from 300 to 500 pounds pressure per square inch. Turner and Zappe (1938) reported on examination of four buildings in which wood was treated in place. In two houses the treatment was apparently effective, in two factory buildings the method failed in spite of re-treatment.

It must be said that it is much easier to treat soil than to treat wood in place. The major emphasis should then be placed on soil treatment, if for no other reason because the chances of success appear to be greater. Certainly also treatment of timbers in place cannot be done cheaply, and in the writer's personal opinion fits into exactly the same category as termite shielding. That is, it is a method available for those home owners who want to take every possible step to eliminate termites, or a method used as a substitute for proper termite-resistant construction.

Supplementary Methods

The NPCA report stresses the destruction of stumps, wood forms and other cellulose-bearing material underneath or near the building. It also calls for adequate ventilation underneath buildings. It is unusual to find a building needing ventilation in this area, because most year-'round dwellngs have basements, and commercial structures either have basements, or are built of concrete laid on the ground.

Conclusion

The continued emphasis of NPCA on the 1, 2, 3, 3½ principles of termite control has been most gratifying. It is hoped that individual operators will bring their control operations in as close accord with these principles (or revisions of them) as possible. It is admitted that compromises must be made in actual practice, particularly if the home owner is unable to meet the cost of full and complete control measures. However, such compromises should be at the risk of the home owner, and not as a result of the desire of the operator to "cut corners" and "get by" with a cheaper treatment. In other words, effective termite control is a matter of carrying out the fundamental principles, and not of fitting a treatment to the size of the owner's bankroll. Experiment Station and Federal Government bulletins are available for those people who cannot afford your services.

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French Scientist Praises DDT in Letter to Veteran

Robert O. Williams has received a letter from Dr. Charles Girard in France, singing the praise of DDT.

Mr. Williams made Dr. Girard's acquaintance in France in June, 1945, while Mr. Williams was a sergeant in sanitation control stationed in Paris.

His office received a complaint from Garches, a suburb, that flies were about to "take" the community. He went to Garches and discovered the source. It was the Pasteur Institute, considered the seat on modern biology.

"The Institute formerly was Napoleon's stables." Mr. Williams says, "They were donated to the Institute as a production laboratory, and from the looks of the place the horses had been donated too."

He said an open yard was filled with dead horses.

Dr. Girard was chief veterinarian. He was apologetic. He explained the blood is drawn from the horses for use in serums, but because the Institute had no trucks and could borrow none, it was impossible to remove the horses for disposal.

Sergt. Williams made arrangements to abate the nuisance. He obtained a quantity of DDT. Dr. Girard and his associates never had heard of it. He left the DDT with instructions as to how to use it.

Mr. Williams now is out of the service, and is back in the pest control business with which he was associated before the war. The letter received from Dr. Girard says that thanks to DDT the flies at the Institute have disappeared.

Mr. Williams studied in the Camp Grant, Ill., sanitation school; Tropical Medicine School, Washington, D. C., and the Malaria Control School Algiers, North Africa.

He got his first experience with DDT in Naples, Italy, where typhus threatened the population.

He believes it was the first time the Army used DDT in disease control. The entire population was deloused by dusting the clothing of each individual.

"It must have been effective for the Typhus Control Commission reported the epidemic was stopped," he says.

The above news item recently appeared in the Evansville Press, Evansville, Indiana. R. O. Williams is owner of R. O. Williams Company, that manufactures and sells Sanitary Pest Control Products. This speaks well of Mr. Williams.

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This flat statement was made on April 4 by the manager of one of the best clubs in the Wall Street area of downtown New York.

The club had been serviced diligently by one of New York's leading pest-control operators, but roaches continued to be a serious problem. They even appeared in the dining room. All available roach-control measures were tried, but the insects continued to multiply.

Finally, last Fall, one of the directors of the club turned the problem over to our laboratories. Working with the exterminator, we supplied him with Prentox Chlordane Concentrate, then a new material. Using it in liquid spray form at 10% concentration (2% $C_{10}H_6Cl_8$), complete control was effected. The pest control operator still treats the premises regularly, but he delivers *guaranteed results.*

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"FLY-PROOFING"

By GEORGE R. CHAMLIN

Presented before the Eastern Pest Control Operators Conference at the Massachusetts State College, Amherst, Mass. on February 3, 1947.

DURING the past year a lot of folks wondered what was going on in Chicago. Our formula, utilizing 'Gammexane' had proved so successful in laboratory tests and limited field demonstrations that we decided to guarantee to control flies for the entire season with a single application.

We not only held all information strictly to our selves, **we also held our breath!** With the variety of conditions presented in treating commercial locations, we could not know just how far out we were sticking our necks. Whenever we were questioned by newspaper reporters or propositioned by other pest control operators who observed our results, we had nothing to say.

When the season ended and we checked results to see how well our singleshot process worked (and likewise checked our accounts receivable) we were convinced that we had a contribution for the pest control industry.

In our search for safer and more effective fly control methods, crude benzene hexachloride was one of many products tested. Reports of the high insecticidal properties of benzene hexachloride were received from Imperial Chemical Industries in England.

Crude benzene hexachloride was rejected for our purpose, because of its peculiar musty odor and because the active toxicant 'Gammexane' could be extracted and scientifically formulated.

We were successful in masking the slight odor of the pure Gamma Isomer and incorporated it in a finished product which was used successfully as a residual for the control of flies, gnats and mosquitoes during the 1946 Chicago fly season.

In the pure state 'Gammexane', which is the gamma isomer of benzene hexachloride $C_6 H_9 Cl_6$ exists as colorless crystals relatively insoluble in water, soluble in many common organic solvents, practically odorless, somewhat bitter in taste, and melting at 112.5° C. It is in this relatively pure state that 'Gammexane', if formulated with various solvents, emulsifiers and aliphatic halogenated lipoid soluble compounds, produces a straw-yellow sweet smelling liquid having a flash point of 106° F when tested in the Tagliabue closedcup. This concentrate is diluted with four parts water for Fly-proofing and most other service work. Oil base solvents, also may be used, but our Pest Control Division uses the water soluble exclusively, because it is safer in all respects.

Due to pending patent applications the percentage composition of this concentrate and process of manufacture cannot be released at this time.

The effectiveness of this preparation has been confirmed by many pest control operators throughout the country, who have tested samples. Although developed as a flyproofing residual, the Chemiste Scientific Process (and I prefer to call it a process, of prime importance for successful results) is effective against other insects and has residual or lasting effect when properly applied.

Several hundred flyproofing contracts were serviced in the Chicago area in 1946 including bakeries, restaurants, stores, food processing plants and institutions. This process was sold as a single flyproofing application and we guaranteed to control flies throughout the entire season. Less than 5 per cent of these accounts were retreated and usually because extensive washing or decorating had been done on the treated surfaces. We retreated only if complaints were received and did not make inspection calls until the season ended.

In a practical test in a restaurant a spray containing 1 per cent Gammexane was applied to the surrounding surfaces. Twenty-four hours later 624 dead and dying cockroaches were counted, and two weeks later the premises were completely free of insects.

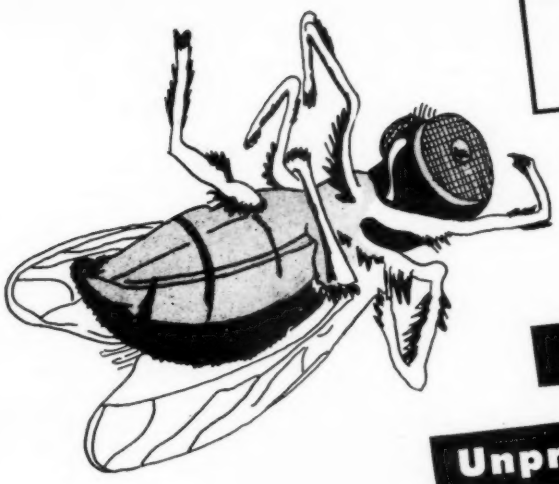
'Gammexane' has proved to be highly effective against bedbugs. In order to simulate natural conditions cages containing miniature mattresses were used. The spray was applied to the mattresses and to the lower half of the cages at the rate of 20 mg. per square foot of surface. Fresh bedbugs were introduced periodically. Mortality in these cages was complete even after 290 days. In several small tests in rooming houses and on large scale in a nearby prison a single application of a 0.5 per cent emulsion of 'Gammexane' gave complete freedom from bedbugs for more than twelve months.

'Gammexane', mixed with flour and sugar, one part to five hundred, was fed for ten days to a hundred cockroaches (ten in each of ten jars) all but three of which died. In other tests 1 per cent of Gammexane in talc was applied on a band one inch wide across the center of a pen twenty inches square. All the adult roaches exposed were killed within twenty hours.

Wherever roaches were present in premises where fly-proofing operations were carried out, up to 75 per cent of the roaches were killed by the single fly-proofing operation and usually a 100 per cent kill was obtained on roaches when the process was applied with a Breuer pressure gun. It is a slow killer taking three to five minutes for flies to become drowsy after coming in contact with treated surfaces and approximately 15 to 20 minutes to die. While spraying, 'Gammexane' has quick knockdown effect and premises are immediately cleared of flies.

'Gammexane' can be used safely and effectively by the pest control operator for fly-control work. We cannot claim 'Gammexane' to be a cure-all, because its full possibilities are still unknown, but we have found it completely satisfactory for fly-proofing service. Although this concentrate, when diluted with four parts water, is an effective all-round insecticide for residual use, its performance as a fly killer is unexcelled.

Here are a few official statements by others who have observed experiments with 'Gammexane' and with the crude benzene hexachloride of which Gammexane constitutes only 10% to 12%. Mr. E. F. Knipling, Bureau of Entomology and Plant Quarantine has credited 'Gammexane' with being many times more toxic to flies than DDT.



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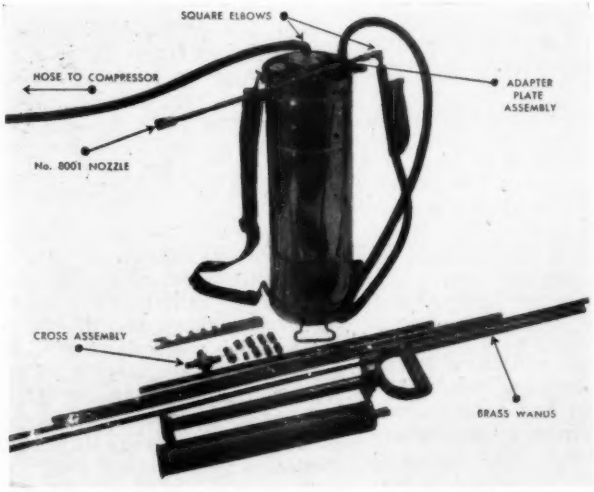

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CROSS ASSEMBLY permitting 1 to 3 sprayers to operate from single ¼ h.p. compressor unit	$1.68

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The Chemiste SCIENTIFIC PROCESS
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Dr. F. C. Bishopp, Bureau of Entomology and Plant Quarantine stated: "On the basis of its gamma content 666 has been found by the division of control investigation to be 7 to 11 more times toxic to house flies than para-para DDT.

D. G. Sanders, Entomologist for Commercial Solvents Corp. rates a concentration of 1.55 gamma isomer as being 8 to 9 times more toxic to flies, mosquitoes and gnats than DDT and only 1/5 as toxic to warm blooded animals.

Is the Chemiste Scientific Process poisonous?

Dr. H. Taylor of England stated: "There appears to be little or no danger to animals by the use of 'Gammexane' but with all new chemicals we have to watch carefully the effect upon the skin."

Dr. G. R. Cameron, in the British Medical Bulletin 1945 writes: "Skin and oral tests show that considerable amounts of 'Gammexane' can be safely applied to the skin or ingested. We have not heard of any cases of human intoxication."

Laboratory workers and technicians at the Continental Chemiste Corp. have completed a one-year period of daily handling of pure 'Gammexane' in the preparation of the Chemiste Scientific Process without gloves or masks. Technicians have daily sprayed with the diluted insecticide and handled the concentrate without protection to hands, face or arms and without masks. Periodic medical examinatons have revealed no evidence of any harmful effects. Salesmen and Technicians have eaten fruits and bakery products after they were sprayed to prove non-toxic feature, all with non-harmful effects.

It is recommended, however, that the concentrate be kept from coming in contact with the skin as some persons are susceptible to dermititis by prolonged contact with organic solvents. Although no cases of dizziness or nausea have come to our attention, prolonged breathing of vapors from the concentrate should be avoided. It is further suggested that technicians wear glasses while spraying the diluted insecticide to prevent any drops getting into eyes, which may cause a slight burning. In general, the ordinary precautions taken with any other insecticide should be followed with this preparation. The concentrate is inflammable having a flash point of 106° F. This concentrate can be shipped and handled safely provided the ordinary precautions are taken not to mix near an open flame or store in an excessively heated room. The diluted insecticide presents no fire hazard since the base is water. This is a highly desirable feature in treating hotels, institutions, restaurants and homes.

Out of the numerous accounts serviced for fly-proofing only one mishap occurred in treating too heavily a portion of dark oil-coated wall paper. Some wall surfaces absorb the spray faster than others and after you have had experience in spraying different types of walls you will be able to judge the correct amount of spray each surface will accommodate.

The finest clubs, lounges, restaurants, and hotels can be completely flyproofed by a competent operator without staining even the most ornate surfaces. Not a single report of corrosion of metals was brought to our attention, during or after these extensive spraying operations. Laboratory tests were made on both the concentrate and the finished product using strips of copper immersed in these solutions which were held in a bath for a period of six hours at a constant temperature of 100° C. No blackening or pitting was noticed.

Closed packages of food materials commonly found in groceries were not contaminated in any way by this process. The diluted spray has a pleasant sweet odor which disappears in approximately 20 to 30 minutes after application, leaving a very fine residual coating to give a lasting effect in killing insect pests. Heat and light do not effect the chemical stability of 'Gammexane'. This is to be expected, since, in the process of manufacture, it is exposed to the action of hot water and light for a considerable period.

'Gammexane' has effective residual properties. Under ideal conditions a single application has been known to kill flies and mosquitoes for a period up to one year. The duration of effectiveness under **actual** conditions is a different matter. It varies with different types of surfaces, with the dosage used and with various other factors.

In general use, one cup of the Chemiste flyproofing concentrate containing Gammexane is sufficient to treat effectively each 100 square feet of surface against flies and mosquitoes. If applied before newly painted surfaces are thoroughy dry, effect may be lost in 30 days. Dust and grease deposits covering treated surfaces reduce the residual effectiveness. Vibrations may cause a flaking-off of the residual deposit, however, loss of effect from this cause is negligible in view of the fact that a good deal more area is treated than is actually necessary.

Here is how successful flyproofing was performed by technicians of the Continental Chemiste Corp.

A three-gallon air pressure hand sprayer equipped with a special flat spray nozzle discharging 1/10th gallon of insecticide per minute through an 80° angle was employed.

The concentrate is transported in one-gallon nonbreakable containers and one of these can readily be mixed with four gallons of water in a five gallon army blitz can at the location. The sprayer is then filled with approximately 2½ gallons of the diluted liquid pumped to 60 lbs. pressure, and is then ready to use.

The use of a residual spray is still a comparatively new approach to effective pest control. It should not be used in the same way that ordinary space sprays are used. The aim of residual spraying is to coat the treated surface with a fine deposit or residue of tiny crystals. When insects such as flies, mosquitoes, cockroaches, bedbugs, etc., walk over or rest on this deposit long enough to obtain sufficient exposure, they will be killed. The lethal dose in the case of the newly emerged fly is 0.4 mg. of 'Gammexane' per kg. and for the older adults 1 mg. per kg. With DDT according to tests made by S. Savit and others, the lethal doses required were 2 mg. per kg. for newly emerged flies and 8 to 21 mg. per kg for adult flies.

The operator should spray at a speed which will cover 160 sq. feet of surface per minute. Porous surfaces such as plaster board, celotex, etc. will require two minutes. Glossy surfaces will require only half a minute since too much of the spray on such glossy surfaces will run off in little streams. To correct this, the nozzle should be held further away from the wall or the extension wand moved faster. This should be done only when absolutely necessary, when this occurs, less than the necessary amount of insecticide is being applied.

If drops form on normal surfaces and run down, you are spraying too heavily. If dry spots are left the nozzle is held too far from the area being sprayed.

For normal surfaces, such as wall paper, paint, varnish, etc., hold nozzle 18 inches away from surface. On glossy surfaces, hold nozzle 25 inches away. On porous surfaces, 12 inches away. One gallon of diluted concentrate will cover approximately

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Gamex holds considerable promise as an aphicide, and for control of lice, ticks, cotton boll weevil, leaf hoppers, grasshoppers, wire worms, fall army worms, tarnished plant bugs, and certain other insects.

Gamex will be supplied in dust base, spray base and water miscible forms which will be produced under the usual Pennsalt high standards of quality.

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- Penco Cattle Spray containing 50% DDT
- Penco Emulsion Concentrate for water emulsion DDT sprays
- Penco Solvent Concentrate for DDT fly sprays
- Penco Calcium Arsenate
- Penco Grain Fumigant
- Penco 2, 4-D Weed Killer
- Penite 6 Weed Killer, concentrated sodium arsenite
- Penite Concentrate 40 weed killer
- Kryocide Natural Cryolite Insecticide

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1600 sq. feet of normal surface. Recharge the tank when pressure drops to 30 lbs. When the valve is held open the spray should consist entirely of very fine particles, not a mist or fog, nor should any large drops form.

The nozzle must be kept clean and free of clogging particles. It should never be allowed to rest on the ground or on any other dirty surfaces.

Thoroughness of spraying cannot be over emphasized since the thousands of tiny almost invisible crystals must remain distributed evenly on the wall or ceiling after the spray liquid has evaporated in order to get the maximum results.

The operator should spray the walls, ceilings, screen doors, entrance and exit areas, garbage disposal basement stairways and all well lighted areas including all lighting fixtures and light cords. Walls and ceilings in commercial kitchens may be treated heavily to offset steam vapors, dust and grease fumes. Extension wands in two and four foot lengths will reach high ceilings and walls. We avoid treating mirrors, show cases, windows or dark colored veneer. However synthetic detergents or Bon Ami will remove any residue which may cloud these surfaces.

We treat after annual decorating is finished, allowing ten days for paint to dry thoroughly.

We use the same dilution, four parts water to one part concentrate, in treating for moths, meal moths, mosquitoes, roaches, silverfish, bedbugs, ants and gnats. In the case of roaches, a Brueur high pressure gun which forces the solution into cracks and crevices will prove most effective.

Other products and methods utilizing 'Gammexane' are being tested in our laboratory and in the field and will be passed along to the pest control operator when we have proved their effectiveness in actual pest control work.

In addition to various powders, we are testing insecticide papers. Rolls of Kraft paper are treated with various concentrations of 'Gammexane' ranging from 5 to 700 mg. per sq. foot. These rolls can then be cut into strips and tacked under bars, placed in show cases and on shelves. These papers are particularly advantageous in special cases where spraying operations cannot be used. 'Gammexane' powders are being tested and show great promise for more effective roach control since these pests can pick up a lethal dose more readily in the powder form than in a dried crystal form. Special equipment for spraying the powder at high pressures is being given particular attention.

Mr. E. F. Knipling of the U. S. Department of Agriculture, in his address before the recent National Pest Control Assn. Convention in New Orleans, stated that tolerance of flies is disappearing. "People will demand their absence from homes, stores, institutons, etc."

In Chicago, we have proved that a toxicant such as 'Gammexane' properly formulated and correctly applied can effectively and safely decimate the scourge of disease spreading insect pests.

"Fly-Proofing" with the new "Chemiste Process." Two service men from Smitter Pest Control Service. Grand Rapids, shown "Fly-Proofing" an interior. Harold Smitter, president, of the firm looks on.

THE IDEAL BLATTIDICIDE

DR. HEBER C. DONOHOE, Research Director, William Peterman, Inc.

A year or so ago I drew up, based on our Research Department experience, a list of ten requirements for what I regard as the "ideal blattidicide." (1) "Ideal" is used with many reservations for I do not believe that any individual knows enough about roach bionomics to be qualified to set up truly ideal qualifications. These requirements have served, more or less, as a guide in our experimental work and thus far stand, in our thinking, substantially unchanged since first prepared. I hope that their publication in PESTS will, if nothing else, stimulate others in thinking about "what constitutes an ideal insecticide for roach control."

Others may not agree, but I submit that an ideal blattidicide should extirpate the roach population from the area treated. On this basis, certain currently-extolled chemicals and formulations which work chiefly by temporarily barricading exits from concealment areas would not rate highly.

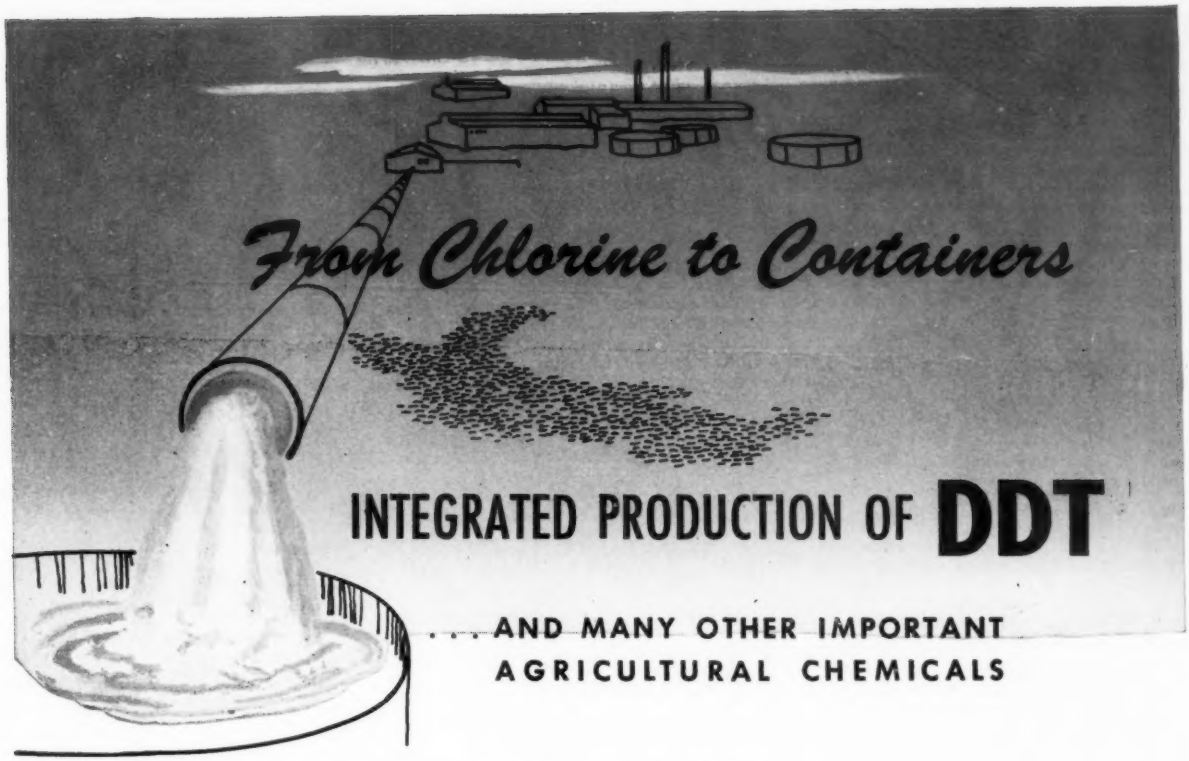
My annotated list of requirements for this ideal substance appears below:

1 It must be a powder rather than a liquid.

(a) Roaches hide, live, and lay their eggs deep within crevices in walls, behind baseboards, around pipe lines and the like. Conference with authorities on aerodynamics some years ago developed the thesis, later proven to our satisfaction by practical field experimentation, that liquids, regardless of how dispensed (electric, hand pump, aerosol, steam vaporizer) will not enter into and penetrate effectively throughout such breeding areas. By the same thesis, air-bornes powders, if correctly formulated and properly milled, when propelled from a hand duster into the openings of crevices will penetrate throughout the concealed spaces involved.

(b) Lacking a duster, a powder can be shaken out in barrier lines in front of hiding places and across areas which roaches are known to forage. Provided that the powder possess the necessary long-lasting effectiveness it will kill the roaches which cross it and, over a period of several weeks, will give very satisfactory roach control. Liquids on the other hand, and including much-publicized residual-types, in our field experience kill chiefly by direct spraying on the roaches and, upon drying possess little to no lasting lethal properties. Rather, surfaces treated with these materials appear to be chiefly repellant and serve to barricade exits from

(1) The use of "Blattidicide" as a synonym for "insecticide for roach control" may be new. The term is applied in conformity with the philosophy of terminology expounded by Professor L. M. Peairs, Editor, in the October 1946 issue of the **Journal of Economic Entomology.** The name, of course, is derived from the roach family name, **Blattidae.**



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Westvaco is an important producer of Agricultural Chemicals, Insecticides and Fumigants such as DDT and its 50% dust formulations, Methyl Bromide, Soil Fumigants and Grain Fumigants compounded from Carbon Tetrachloride, Ethylene Dichloride, Ethylene Dibromide and Carbon Bisulphide. Other Westvaco Chemicals include Alkalis, Chlorine, Chlorinated Solvents, Phosphates and Barium and Magnesium Compounds and Related Chemicals. Write for our complete product list.

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concealment areas for greater or less time intervals.

The other important requirements for an ideal blattidicide stem from the fundamental decision that it must be a powder.

2 The powder must be light and fluffy so that it flows readily from dusting apparatus and carries well in the air currents set up when it is blown into hidden spaces.
Its light, fluffy character must be nicely balanced so that it will not float indefinitely but rather will settle as an even cover within a few moments after dusting.

3 It must flow readily from the package and must not cake or lump during package life.

4 It must adhere well to roach bodies and appendages or kill directly through contact with the insects resting on treated surfaces, or both.

5 it must remain as a fluffy powder after application. Any tendency to absorb atmospheric moisture (hygroscopicity) sooner or later (often within 24 to 48 hours) will result in surface case-hardening and resultant ineffectiveness albeit the ingredients as such remain active.

6 It must possess shelf-like stability and long lasting effectiveness after application. Given the latter, the former is almost axiomatic. Not only should an ideal powder eliminate the infestation present at treatment, but also it should stand guard in breeding areas against reinfestation for long periods after treatment. There has been no basis for arbitrarily stating the protection period one should expect, but in the light of our own experience, three months is conservative provided the initial treatment is thorough.

7 The ideal powder must be dramatically quick-acting both to speedily remove the roach nuisance and because of the intrinsically-valuable psychological effect upon the purchaser and user.

8 It must be thoroughly milled (intimately blended) so that the active killing agents are dispersed uniformly throughout the product.

9 It must be sufficiently inexpensive so that it can rest and hold a favorable position in a fiercely-competitive market.

10 It must be completely safe to use, i.e., with no threat of poisoning to humans or pets through accidental swallowing, skin contact, or inhalation. While I have intentionally listed this requirement in last place, it certainly is of maximum importance.

The above might well be dubbed the "Ten Commandments" for the researcher on roach control products. To my knowledge their organization into a group of essential requirements is original. I feel it is safe to speculate that no blattidicide offered to the public prior to 1946 has possessed as many as five of these ten qualifications. From limited information at hand there may be several that will rate well in most of these respects in 1947.

The Lepidoptera in Fact and Poetry: Part II - The Moths*

By C. R. TWINN, Ottawa, Ont.

AS MENTIONED at the beginning of Part I of this article a large proportion of the species of the order Lepidoptera are called moths, most of which differ from the butterflies in possessing feathered or threadlike antennae, in holding their wings while at rest in a horizontal position or folded over the abdomen, and in flying chiefly at night, and being attracted to lights. A further point of difference is that with few exceptions the butterflies are comparatively innocuous, whereas the moths are of very great economic importance, their larvae causing immense annual losses to field and garden plants, and forest, shade, and fruit trees, and also to fabrics and stored products of all kinds. On the credit side must be mentioned the valuable silk produced by the larvae of the silkworm moths.

The fatal attraction that light has for the night-flying moths was noted by a number of English poets. In Shakespeare's day it was the crude and feeble candle that drew the moths. Shakespeare mentions it in **The Merchant of Venice** (II.9), in the words of Portia uttered when the Prince of Arragon, disappointed in his efforts to obtain her hand, departs:

"Thus hath the candle singed the moth."

In John Gay's **Beggar's Opera** (I. 4), Mrs. Peachum uses the moth to moralize on her daughter Polly's love for a highwayman. She sings:

"If love the virgin's heart invade,
How, like a moth, the simple maid
Still plays about the flame!"

Fly screens are not so necessary in England as in North America and in the past have not been so widely used. One may imagine, then, that poets and other writers busy on summer evenings beneath their lamps must have been frequently startled or annoyed by the intrusion of moths and other insects through open windows from outdoors. Thomas Carlyle, indeed, wrote a poem on **The Tragedy of the Night-Moth.** This poem points a moral and is coloured to some extent with pessimism and self pity, which may have been due to Carlyle's habitual dyspepsia and overwork. Eight of the fourteen stanzas follow:

"'Tis placid midnight, stars are keeping
Their meek and silent course in Heaven;
Save pale recluse, for knowledge seeking,
All things to sleep are given.
"But see! a wandering Night-Moth enters,
Allured by taper gleaming bright;
Awhile keeps hovering round, then ventures
On Goethe's mystic page to light.
"With awe she views the candle blazing;
A universe of fire it seems
To moth-savant with rapture gazing,
Or Fount whence Life and Motion streams.

"What passions in her small heart whirling,
Hopes boundless, adoration, dread;
At length her tiny pinions twirling,
She darts, and—puff!—the moth is dead.

* * *

"Poor moth! near weeping I lament thee,
Thy glossy form, thy instant woe;
'Twas zeal for 'things too high' that sent thee
From cheery earth to shades below.

* * *

"Like thee, with common lot contented,
With humble joys and vulgar fate,
I might have lived and ne'er lamented,
Moth of a larger size, a longer date!
"But Nature's majesty unveiling
What seemed her wildest, grandest charms,
Eternal Truth and Beauty hailing,
Like thee, I rushed into her arms.
"What gained we, little moth? Thy ashes,
Thy one brief parting pang may show:.....
And thoughts like these, for soul that dashes
From deep to deep, are—death more slow!"

According to Byron, in his **English Bards and Scotch Reviewers,** "maidens like moths are ever caught by glare, and Mammon wins his way where seraphs might despair." His contemporary, Shelley, also employed the moth's weakness for light in two similes. In **Epipsychidon,** he says, "Sweet Lamp! my moth-like Muse has burnt its wings:" and in **Medusa** (IV. 6) he uses the words, "like a moth that hies after a taper." The irresistible reaction of the moth to the stimulation of light on its optic nerves was recorded by Tennyson, in **Sir John Oldcastle** (189):

"Thy moth will singe her wings, and
singed return,
Her love of light quenching her
fear of pain."

In scientific language, insects such as moths which are attracted towards the source of light are said to be "positively phototropic."

The moth life-history is broadly similar to that of the butterflies, the insects progressively passing through the egg, caterpillar, and pupal or chrysalis stages, to the winged adult form. In details, of course, there are marked variations among the different species. In all of them it is only the caterpillars that are injurious. According to the Oxford Dictionary, the name caterpillar is perhaps derived from the old French **chatepelose** which means literally "hairy-cat." Many species of caterpillars are thickly covered with hairs.

The Bible contains a number of references to the caterpillar (**I Kings,** 8. 37), cankerworm, and palmerworm (**Joel** 1. 4). Some students believe that the translators were none too sure of the precise meaning of the original Hebrew words denoting insect pests and compromised by interpreting them in the form of common English species. Topsell, (3) is quoted as recording in the seventeenth century, that there is in England a kind of caterpillar which "do wander and stray hither and thither and like Mise, consume and eat up that which is none of their owne; and these have purchased a very apt name amongst us Englishmen, to be called Palmerworms, by reason of their wandering and rogish life, although by reason of their roughness and ruggedness some call

* Contribution No. 2435, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada.

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them Beare-wormes." Further, in England the name cankerworm might be given to any caterpillar that feeds upon plant foliage.

Damage done by moth larvae has been alluded to on numerous occasions in poetry and drama. In Chaucer's **Wyf of Bathe's Tale** (376) is the remark:

"Thou seyst, that right as wormes shende a tree,
Right so a wyf destroyeth hir housbonde;
This know they that been to wyves bonde."

Spenser wrote of "the goodly Oak" in **The Shepheard's Calendar** (F. 13) that:

"His bared boughes were beaten with stormes,
His toppe was bald, and wasted with wormes."

and further (F. 179) that the ill-intentioned briar (Brere) complained to the husbandman that the old oak was overcrowding it:

"And oft hee lets his cancker-worms light
Upon my braunches, to worke me more spight;"

The cankerworm may have been the oak-tree pug, **Eupithesia dodoneata**, which feeds on the young leaves of oak in southern English woods.

Shakespeare found the caterpillar a very useful creature to illustrate his meanings. In the poem **Venus and Adonis**, Adonis rebuffed the passionate advances of Venus, saying:

"Call it not love, for love to heaven is fled,
Since sweating lust on earth usurp'd his name;
Under whose simple semblance he hath fed
Upon fresh beauty, blotting it with blame;
Which the hot tyrant stains, and soon bereaves,
As caterpillars do the tender leaves."

Destructive elements in the kingdom are likened to caterpillars in **King Richard II** (II. 3 and III. 4). Bolingbroke called Richard's creatures Bushy and Bagot and their accomplices: "The caterpillars of the commonwealth, which I have sworn to weed and pluck away." Again, when the gardener instructed the servant to "cut off the heads of the too fast-growing sprays" in the garden the latter, also referring to subversive elements in the community, protested:

"Why should we in the compass of a pale
Keep law, and form, and due proportion,
Showing, as in a model, our firm estate;
When our sea-walled garden, the whole land,
Is full of weeds; her fairest flowers choked up,
Her fruit-trees all unpruned, her hedges ruin'd,
Her knots disorder'd, and her wholesome herbs
Swarming with caterpillars?"

The poet's awareness of the great damage that moth larvae may do was further demonstrated in 2 **Henry VI** (III. 1). When the Duke of Somerset reported to King Henry that he had lost all his French territories, the scheming Duke of York muttered to himself:

"Cold news for me; for I had hope of France . . .
Thus are my blossoms blasted in the bud,
And caterpillars eat my leaves away."

Shakespeare sometimes substituted for caterpillars the terms "canker" or merely "worm" to denote injurious lepidopterous larvae. For instance, in **Romeo and Juliet** (I. 1), Montague says of his son Romeo that he is:

". . . to himself so secret and so close,
So far from sounding and discovery,
As is the bud bit with an envious worm
Ere he can spread his sweet leaves to the air,
Or dedicate his beauty to the sun."

And Viola, in Twelfth Night (II. 4), while masquerading as a boy, tells the Duke of Illyria, whom she loves, that her "sister"

". . . never told her love;
But let concealment, like a worm i' the bud,
Feed on her damask cheek."

In **The Two Gentlemen of Verona**, Proteus excused himself on being in love by remarking to his friend Valentine:

"Yet writers say: as in the sweetest bud
The eating canker dwells, so eating Love
Inhabits in the finest wits of all."

To which Valentine made withering reply:

"And writers say: as the most forward bud
Is eaten by the canker ere it blow,
Even so by Love the young and tender wit
Is turned to folly; blasting in the bud,
Losing his vendure even in the prime,
And all the fair effects of future hopes."

There are at least half a dozen similar allusions to moth larvae in Shakespeare's plays, but one more must suffice. This occurs in **Midsummer Night's Dream** (II. 2), when Queen Titania instructed some of her fairy attendants: "To kill cankers in the musk-rose buds."

Milton, too, showed familiarity with the caterpillars that cause injury and death to the beautiful blossoms of the rose, in the following lines from **Lycidas:**

"As killing as the canker to the rose,
Or taint-worm to the weanling herds that graze,
. . . .
Such Lycidas, thy loss to shepherd's ear."

The forthright Robert Burns once likened the Duke of Queensbury to a destructive insect. In 1795 the Duke stripped the woods from certain of his domains in Dumfriesshire and Peebleshire to raise money. In his poem Burns asked the genius of the River Nith who had removed the trees, whether wind, lightning or cankerworm:

"'Nae eastlin blast,' the sprite replied,
'It blew na here sae fierce and fell,
And on my dry and halesome banks
Nae cankerworms get leave to dwell:
Man! cruel man!' the genius sighed—
As through the cliffs he sank him down—
'The worm that gnawed my bonny trees,
That reptile wears a ducal crown'."

In the opinion of Shelley, the untimely death of the poet Keats was hastened by a severe criticism of his **Endymion**, which appeared in the Quarterly Review. In the preface to **Adonais** (1821), an elegy on the death of John Keats, Shelley gave expression to this conviction and referred to the critics as "canker-worms." Said he: "where canker-worms abound, what wonder, if its young flower (of Keat's genius) was blighted in the bud." However, Shelley was apparently not well informed about insects, or had an undue sympathy for some of them, for in **The Sensitive Plant** he refers to "soft moths that kiss the sweet lips of the flowers, and harm not." Actually most moths are harmful to some extent in their larval form. He reveals the same sentimental regard for insect pests in two other stanzas of the same poem. A sensitive plant was growing in a garden tended from dawn till dusk by a lady.

"And all killing insects and gnawing worms,
And things of obscene and unlovely forms,
She bore in a basket of Indian woof,
Into the rough woods far aloof,—
In a basket of grasses and wild flowers full,
The freshest her gentle hands could pull,
For the poor banished insects, whose intent,
Although they did ill, was innocent."

In practice, of course, the insects would probably not be long finding their way back to the garden in greater numbers than ever, for most of them are very persistent—and prolific. Moreover, such control measures would not likely be popular with the neighbours.

Cowper showed a more usual conception of insect pests when he wrote of:

". . . caterpillars dangling under trees
By slender threads and swinging in the breeze,
Which filthily bewray and sore disgrace
The boughs in which are bred th' unseemly race."

This may refer to the larvae of the lackey moth of Europe, **Malacosoma neustria** L., which construct silken tent-like webs in trees and feed on the foliage. This species is generally distributed in England and is especially injurious to the foliage of fruit trees. Related species in North America are called tent-caterpillars and are widespread pests of deciduous forest, shade and fruit trees.

People generally, when they hear the word moth, think of one particular kind of moth, the clothes moth. This is because most people at one time or another suffer losses due to the activities of this ubiquitous pest. At least two species: the case-making clothes moth, **Tinea pellionella** L., and the webbing clothes moth, **Tineola biselliella** Hum., are common and widely distributed, the latter being the more abundant and destructive.

Clothes moths have been troublesome pests to man for a very long time. The Bible contains several allusions to them. In **Isaiah** (51. 8) appears the statement:

"The moth shall eat them up like a garment, and the worm shall eat them like wool."

In **Matthew** 6. 19) the following advice is given:

"Lay not up for yourselves treasures upon earth where moth and rust doth corrupt, and where thieves break through and steal: but lay up for yourselves treasures in heaven, where *neither moth nor rust doth corrupt, and where thieves do not break through nor steal."*

The clothes moth adults do no damage, they merely mate and lay eggs. It is only the larvae that are injurious. These feed exclusively on materials of animal origin such as wool, fur, feathers, and silk from the silkworm. Vegetable matter such as cotton is immune to them. Evidently wool was one of the chief materials used by the ancients to retain bodily warmth. Aristotle said of the moth in his "History of Animals" (V. 26): "There are other small animals . . . some of which occur in wool and woolen goods, as the worm **(ses)** and these animals come in the greatest numbers when the wool is dusty." The generally accepted fact that moths do most damage to unused, unbrushed clothing was apparently common knowledge in Aristotle's day. It was certainly known in fourteenth century England for in Chaucer's Canterbury Tales, the **Wyf of Bathe** remarked that when she went abroad visiting she wore her "gaye scarlet gytes" (skirt or mantle), and:

"These wormes, ne these motthes, ne these mytes,
Upon my peril, frete (consumed) hem never a deel;
And wostow why? for they were used weel."

This was translated by Pope in his **Paraphrases from Chaucer: Prologue, The Wife of Bath**, as:

"The wasting moth ne'er spoil'd my best array;
The cause was this, I wore it every day."

Chaucer made an apt allusion to the clothes moth in **The Tale of Melibeus**, thus:

"Solomon seith: that right as motthes in the shepes flees anoyeth to the clothes, and the smale wormes to the tree, right so anoyeth sorwe (sorrow) to the herte."

It is the habit of the clothes moths and their larvae to avoid light. Because of this, the concealed portions of susceptible goods are most likely to be damaged by them. This important ecological fact was pointed

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out by Spenser nearly four centuries ago, in the **Faerie Queen** (II. ii. 34), in his description of the feelings of two sisters towards another sister, when they were entertaining the knights of opposing forces during a truce after a fight.

"For both did at their second sister grutch
And inly grieve, as doth an hidden moth
The inner garment frett, nor the 'utter touch."

As one would expect, the observant Shakespeare was familiar with the destructive proclivities of clothes moths. Thus, in **Much Ado About Nothing** (III. 3), Borachio refers to "the smirched moth-eaten tapestry", and, in **Coriolanus** (I. 3) Valeria says to her friend Virgilia, who refused to put away her knitting:

"You would be another Penelope; yet, they say, all the yarn she spun in Ulysses' absence did but fill Ithaca full of moths."

In view of the length of Ulysses' absence visiting Troy this, perhaps, was not surprising.

Nowadays, higher living standards and the general distribution of goods produced by modern science and technology have greatly increased the moth's destructive potentialities. On the other hand, ways and means of preventing moth damage have been developed and people are better informed on the subject of control than they were a few generations ago. However, the moth-proofing of fabrics, which involves immersing them in various insecticide solutions either during the dyeing process or subsequently, was not developed until the twentieth century. Knowing this, one can better appreciate Keat's meaning in **The Fall of Hyperion** (I.75) wherein he wrote that he awakened in a dream in an old sanctuary and saw:

"Upon the marble at my feet there lay
Store of strange vessels and large draperies,
Which needs had been of dyed asbestos wove,
Or in that place the moth could not corrupt,".

Pests of another kind are those species of moths which attack cereal products such as flour. One of these is the Mediterranean flour moth, **Ephestia kuehniella** Zell., the larvae of which are great pests in flour mills. Probably this is the insect alluded to in the old English folk ryhme which runs:

"Millery, millery, dusty poll,
How many zacks hast thee astole?
Vour and twenty an' a peck,
Hang the miller up by 's neck."

In country districts in England, as also in parts of North America, the word "miller" is frequently used in place of "moth".

Among the numerous kinds of moths that fly in gardens at dusk or after dark are several species of rather large size with compact bodies and powerful wings, which in general conformation somewhat resemble the modern pursuit plane. These are called hawk or sphinx moths, and they develop from large, rather smooth-skinned caterpillars which bear a spine or horn at the tail end, a feature that has earned them the name of hornworms. The powerful flying powers of these moths enable them to hover over flowers and, without alighting, extract the nectar through their long, flexible tube-like mouthparts. George Crabbe, an eighteenth century English poet of rural life wrote of the:

". . . hungry sphinx, who threads the honeyed flower;
She o'er the larkspur's bed, where sweets abound
Views every bell and hums the approving sound."

The approving sound, of course, is made by the rapidly vibrating wings. One of these species, **Acherontia atropos**, bears the gruesome name of the death's head moth, and is a large insect measuring about five inches from tip to tip of the expanded wings. It received its name because of the scale pattern on the thorax which has a resemblance to a skull and crossbones. Thomas Hood alluded to it for spooky atmosphere in **The Haunted House:**

"And on the wall, as chilly as a tomb
The death's-head moth was clinging."

This moth is unusual in several other respects. It has been noted entering bee-hives of the "old straw-skep pattern", to rob the bees of their honey. It is also capable of making a shrill squeaking sound. The larva, too, makes a "cracking" sound when annoyed, by clashing together its mandibles. It commonly feeds on the foliage of potato and related plants.

Another moth with an uncanny name is the ghost moth, **Hepialus humuli**, which belongs to a family of very fast fliers. The male of this species is white and is sought after by the female instead of vice versa. The moths fly in the evening, at or before dusk. The males sway to and fro without making progress, as if suspended in mid-air, and the females fly straight towards them seeking a mate. Alexander Smith wrote of this species:

"And o'er the darkening heath and wold
The large ghost moth doth flit."

It has a wide distribution in the British Isles, the caterpillars feeding on the roots of weeds such as burdock and dandelion. Kirby and Spence have recorded that in the north and west of England, moths which fly into candles used to be called "saules", perhaps because of an old belief that the souls of the dead fly about at night seeking a light. They also mentioned that, probably for the same reason, such moths were often called "Geistchen" (ghosts) in Germany.

W. B. Yeats alluded to white moths in **The Song of Wandering Aengus**, but doubtless a different species was meant.

"I went out to the hazel wood,
Because a fire was in my head,
And cut and peeled a hazel wand,
And hooked a berry to a thread;
And when white moths were on the wing,
And moth-like stars were flickering out,
I dropped the berry in a stream
And caught a little silver trout."

Alfred Noyes may have been referring to the magpie moth, **Abraxas grossulariata**, the larvae of which are a serious pest of currants and gooseberries in English gardens, when he describes how:

". . . luxuriating in heat,
With slow and gorgeous beat,
White-winged currant-moths display
Their spots of black and gold all day."

As this description indicates, not all moths are drab-coloured. Indeed, many of them rival butterflies in the brilliance of their colour patterns. The stout-bodied tiger moths frequently have their rather broad wings spotted or banded with bright colours. Keats makes use of this feature in a description in **St. Agnes** of:

". . . casements high and triple arch'd—
All garlanded with carven imag'ries
Of fruits, and flowers, and bunches of knot-grass,
And diamonded with panes of quaint dyes,
Innumerable of stains and splendid dyes,
As are the tiger-moth's deep damask'd wings."

The larvae of the tiger moths are densely covered with long hairs, a characteristic which has earned them the name of bear-worms, or woolly-bears. The hairs are used by the larvae in constructing their cocoons prior to pupatation. Tennyson, too, showed familiarity with lovely coloured moths in **The Princess** (II.19), when he wrote that the college portress brought:

". . . academic silks, in hue
The lilac, with a silken hood to each,
And zoned with gold; and now when they were on,
And we as rich as moths from dusk cocoons,"

she "let us know the Princess Ida waited".

Primitive peoples are known to eat the caterpillars and also the bodies of moths, which are said to have a nut-like flavour. Undoubtedly they would be nourishing and, when properly cooked and served, should be no less palatable than some of the crustaceans considered delicacies and commonly eaten with relish. According to the poets Herrick and Keats, the fairies look upon moths as edible dainties. One of the items on the abundant menu at the fairies' feast enjoyed by King Oberon in Herrick's **Hesperides** was:

". . . a little moth
Late fatten'd in a piece of cloth,"

and thus obviously a clothes moth. Crafticant, in Keat's poetical fairy tale, **The Cap and Bells**, records in his diary that he, at:

"Five minutes before one—brought down a moth
With my new double-barrel—stew'd the thighs
And made a very tolerable broth—
Princess turned dainty:—to our great surprise,
Alter'd her mind, and thought it very nice:"

No discussion of moths would be complete without reference to that extremely important benefactor of the human race, the silkworm, called by entomologists **Bombyx mori L.** In the opinion of Burr (1, p. 258) "No other insects, except the distributors of disease have had so great an influence upon humanity, even though the culture upon humanity, even though to lands where the white mulberry will grow and labour is cheap." Many allusions to silk and silken goods are to be found in the works of the poets and dramatists, and a few refer to the insect itself. Chaucer did not mention the silkworm, but Tatler and Kennedy's Concordance lists fifteen references to silk in his works, of which the following: "A ceynt she werede, y-barred al of silk", is typical. Phipson (2, p. 426) quotes the following lines from Chester's **Love's Martyr** (p. 116):

"The Silkeworme by whose webbe our silkes are made,
For she doth dayly labour with her weaving,
A worme that's rich and precious in her trade,
That whilst poore soule she toyleth in her spinning
Leaves nothing in her belly but empty aire,
And toyling too much falleth to despaire."

The silkworm's silk does not originate "in her belly", but is secreted by silk glands appended to the digestive system and homologous with the salivary glands of other insects. These glands are so long (four times the length of the larva) that in order for the body to contain them they are folded around the hinder part of the intestine. The silk is spun through the mouthparts. The silkworm might well despair, however, for many centuries of domestication have degenerated its larval legs, and removed from the moth the power to fly, so that now it would seem to be entirely dependent on man for its continued existence, and is no longer to be found in nature.

Shakespeare mentioned the silkworm in **Othello** (III.4). This was when Othello, stressing the importance he placed on the return of his mother's handkerchief by his wife, said of it that:

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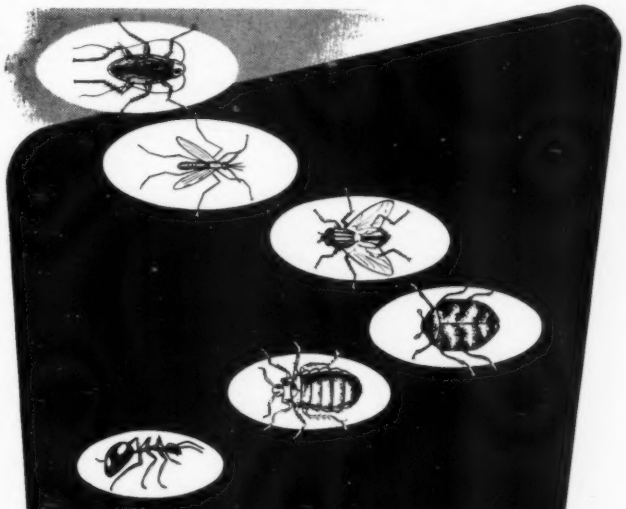

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"How proud we are! how fond to shew
Our clothes, and call them rich and new.
When the poor sheep and silkworm wore
That very clothing long before."

In a sense the silkworm actually does wear the silk before it is utilized by man, for it is woven into the cocoon that protects the insect during the pupal period, and from which man's supply is obtained. As Pope pointed out:

"So opens the silk-worm small its slender store,
And labours till it clouds itself all o'er."

The poet Milton wrote of the silkworm, in **Comus:**

"Wherefore did Nature pour her bounties forth
And set to work millions of spinning worms,
That in their green shops weave the smooth-haired silk
To deck her sons;"

Shelley, in the following lines from his **Letter to Maria Gisborne,** likened himself to a silkworm spinning a cocoon of poetical silk to protect and preserve his memory and immortalize his name.

"The silk-worm in the dark-green mulberry leaves
His winding sheet and cradle ever weaves;
So I, a thing whom moralists call worm,
Sit spinning still round this decaying form,
From the fine threads of rare and subtle thought
No net of words in garish colours wrought
To catch the idle buzzers of the day—
But a soft cell, where when that jades away,
Memory may clothe in wings my living name
And feed it with the asphodels of fame,"

Erasmus Darwin described the life-history of the silkworm in **The Temple of Nature.** The latter part of this description was based on a misconception, for, as pointed out by W. R. Walton (4), the moth takes little or no nourishment and is incapable of flight.

"Erewhile the changeful worm with circling head,
Weaves the nice curtains of his silken bed;
Web within web involves his larva form,
Alike secured from sunshine and from storm;
For twelve long days he dreams of blossom'd groves,
Untasted honey, and ideal loves.
Wakes from his trance, alarmed with young desire,
Find his new sex, and feels ecstatic fire;
From flower to flower, with honeyed lip he springs,
And seeks his velvet loves on silver wings."

Nowadays, the invention and development of various excellent substitutes have rendered real silk much less essential in the manufacture of clothing and other fabrics than in past times, but, nevertheless, the silkworm and its product are still valuable and important for many purposes.

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Ontario Pest Control Association

Ontario Pest Control Association Second Annual Meeting and Banquet was held Thursday, March 20th at the Royal York Hotel, Toronto, Canada. The following Officers and Directors were elected for the ensuing year:

H. R. Corbett, President, St. Thomas, Ont.
C. E. Ryder, Vice-President, Hamilton, Ont.
V. F. Prentice, Secretary, Toronto, Ont.
C. L. Bannister, Treasurer, Toronto, Ont.
R. F. Hamlin, Director, Toronto, Ont.
M. B. Dunn, Director, Ottawa, Ont.
W. G. Westover, Director, Brantford, Ont.
R. N. Dickinson, Director, Toronto, Ont.
E. J. Gentle, Past President, Hamilton, Ont.

The retiring President, Mr. Ed. Gentle, in his annual report gave a good account of the increasing activities of the Association during the past year and took pride in the fact that there is growing goodwill and spirit of co-operation existing between our industry and the various Municipal and Government Departments and Officers dealing with the all important matters of Health. The meeting was honored by the presence of our own William O. Buettner, Secretary of the NPCA, and a resolution was passed unanimously approving the objective to entertain the NPCA's 16th Annual Convention in Toronto in 1948.

The Banquet commenced at 6:30 P. M. following which, entertainment consisting of music and magic was thoroughly enjoyed by all. The Guest speaker of the evening, Dr. Alfred Weed, of New York, gave a most informative talk on the newer insecticides and laboratory reports on various "Things to Come" in this field and this was followed by a general round table discussion led by Dr. Weed. Bill Buettner gave an inspiring talk on the tremendous strides made in the Pest Control industry during the past decade or so and pointed strongly to the real necessity for the PCO's to maintain a sturdy organization and strict code of business ethics in order to further build up the confidence the public is showing in our profession and industry.

W. S. (Bill) Bomby acted as host and toastmaster for the evening and kept things moving along at a sparkling tempo at all times in his own inimitable way.

The following PCO's, allied members and guests were present:

Dr. Gordon P. Jackson, Toronto Medical Officer of Health
Dr. J. G. Cunningham, Director of Industrial Sanitation, Province of Ontario.
A. M. W. Carter, Associate Chief, Pesticides Div., Dominion Dept. of Agriculture, Ottawa.
Dr. Alfred Weed, Entomologist, New York City.
Wm. O. Buettner, Brooklyn, N. Y.
Wm. Gray, Sanitary Inspector, North York.
L. H. Hancey, Sanitary Inspector, East York and Leaside.
Mr. Gomp, Chief Inspector, Health Dept., Hamilton.
A. L. Smith, Health Dept., Toronto
David K. Lee, Chief Inspector, Health Dept., Toronto
F. Belfrey, Health Dept., Toronto
C. Copeland, District Inspector, Dom. Dept. of Agriculture
H. E. Rothwell, Ontario Health Dept.
H. Tyler, Ontario Health Dept.
Harry Trotter, Natural Products Corp.
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The Comparative Residual Toxicity of DDT To Anopheles Quadrimaculatus When Applied on Different Surfaces

By J. M. Clapp, *Junior Assistant Sanitarian (R)*, R. W. Fay, *Senior Sanitarian (R)*, *and* S. W. Simmons, *Sanitarian (R)*, *United States Public Health Service.*

Summary and Conclusions

It has been ascertained that the relationship between various types of household wall surfaces and the residual toxicity of DDT deposits are important factors in the practical use of DDT sprays.

The type of surface influences the residual toxicity of DDT sprays applied at equal rates. DDT on rough wood, fabrics, well-dried paints, and rubbing varnish gives the best residual effect. DDT spray applications on linoleum, fresh paints, spar varnish, or on simulated adobe are not effective against **A. quadrimaculatus** under test conditions. Under the conditions described, even applications of 600 mg. DDT per square foot are ineffective on adobe.

DDT sprays do not damage plastic screen or fabrics which are composed of plant or animal fibers. If applied too heavily, they cause some clouding of high-gloss enamels and some staining of wallpaper. DDT sprays, with either kerosene or Velsicol AR-50 as solvents, produce less deleterious effects on dark-gloss enamels than do the DDT-xylene emulsions.

The nature of the surface definitely affects the final distribution of the DDT deposits. Fabrics, wallpaper, and rough wood tend to hold the crystals on the surface, whereas plain smooth wood is penetrated by the spray and a considerable portion of the spray deposit remains beneath the surface. Linoleum, fresh paints, and varnishes are readily penetrated by the solvents, and some of the DDT crystals are thereby permanently or temporarily occluded. The incorporation of salt into whitewash produces more effective DDT residual deposits on the outer surface of the whitewash. Grease or smoke depositions on surfaces previously treated with DDT decrease the efficiency of the residues. Public Health Reports, Vol. 62, Jan. 31, 1947, No. 5.

2nd Annual Wisconsin Pest Control Operators Meeting

FEBRUARY 28th and MARCH 1st, 1947

The 2nd Annual Wisconsin Pest Control Operators meeting held on February 28th and March 1st at the Loraine Hotel, Madison, Wisconsin, was sponsored by the University of Wisconsin, College of Agriculture, Department of Economic Entomology. More than 80 PCO's, Entomologists, Public Health Officials, and supply house representatives were in attendance.

The meeting opened with a word of greeting and welcome from Harvey W. Klein, President of the Wisconsin Pest Control Association. Harold E. Jennings, Regional Vice President of the NPCA acted as chairman of the morning session on February 28th. This session was followed by a noon luncheon that was high-lighted by an address by Dr. T. C. Allen, Chairman of the University's Dept. of Economic Entomology. Dr. Allen spoke of some of his experiences in commercial pest control as an Entomologist in California a number of years ago and of the continued need of close co-operation between the PCO and the Entomologist.

The afternoon session, devoted entirely to Rodent Control, was presided over by Henry Turrie, Director of the NPCA and the WPCA. A number of Rodent Control Movies and Slides were shown and an interesting question and answer period followed each speaker on the afternoon session.

The Banquet held at 6:30 P. M. that evening proved to be unusually successful for a first attempt. NPCA Secretary Wm. O. Buettner as the speaker of the evening gave an inspiring and splendid history of the progress and activities of the Pest Control Industry of the NPCA. WPCA president Harvey W. Klein presented Honorary Membership Certificates in the Wisconsin Pest Control Association to Professor C. L. Fluke, former Chairman of the Department of Economic Entomology and Professor E. H. Fisher, Extension Specialist of the Department. Professor Fisher was also presented with a beautiful pen and pencil set as a token of appreciation for his effort and work in preparation of the meeting program. The climax of the evening was the presentation to Dr. T. C. Allen by the WPCA of the amount of $100.00 as a humble beginning of a PCO Research Fund to be used by his department. The Banquet program was followed by a number of new movies on Pest Control.

The March 1st morning session was presided over by Harvey W. Klein as Chairman. The noon luncheon was followed by the annual business meeting of the Wisconsin Pest Control Association. The election of officers at this meeting resulted in the following: President, Harvey W. Klein of Milwaukee; Vice President, Howard E. Johnson of Racine; Secretary-Treasurer, L. B. Kelly of Madison; Directors, Miss V. Seaver of Beloit, Henry Turrie of Milwaukee, and Patrick Maloney of Greenbay. Tentative plans for the program and activities for the Association for the coming year were discussed at this meeting.

The afternoon session with Howard E. Johnson, Vice President of the WPCA as Chairman, ended the meeting. One of the outstanding features

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of the meeting was the question and answer period that followed each speaker on the program.

The program in detail was as follows:

FRIDAY - FEBRUARY 28th

Registration—handled by L. B. Kelly and H. E. Johnson.

Insects of Medical Importance
by Dr. C. A. Herrick, Medical Entomologist and Parasitologist of U. of Wisc. Zoology Department.

Control of Insects of Medical Importance
by Dr. R. J. Dicke, Research Entomologist of U. of Wisc.

Restaurant Sanitation
by Mr. O. Manthy, in charge of pest control in Residence Halls of U. of Wisc. and Mrs. Ruth Hoehm, U. of Wisc. Laboratory of Hygiene.

Rodent Control by Chemicals
by Dr. J. T. Emlen, Mammalogist in the U. of Wisc. Zoology Dept. Three years on Baltimore, Md. rodent control program, doing research as a Johns Hopkins Univ. School of Hygiene and Public Health Staff member, on studies of rat life history in relation to control by means of several rodenticides.

Rodent Control by Trapping
by Jessie Scholl, Research Asst. in the U. of Wisc. Ent. & Agronomy Depts.

Ratproofing
by E. J. Tully of Wisconsin State board of Health.

SATURDAY - MARCH 1st

Compounding of Some Insecticides
by Dr. T. C. Allen, Chairman of Dept. of Ent. and Dr. G. S. Kido, research Fellow in U. of Wisc. Economic Ent. Dept.

Weed Control
by Prof. K. P. Buchholtz, Agronomy Dept. of Agricultural Engr. Dept.

PCO Insurance
by A. C. Anderson, Neckerman Agency of Madison, Wisc.

Household Insect Control
by Prof. C. L. Fluke of the Dept. of Economic Entomology.

Control of Wood-Infesting Insects & Fungi.
by R. D. Schenefelt and C. Audrey Richards of the U. S. Forest Products Laboratory, Madison, Wisconsin.

Toxicity of Insecticides to Warm-Blooded Animals
by Dr. F. L. Kozelka, Toxicologist of the U. of Wisc. Medical School; and Dr. H. F. Wilson and Dr. J. H. Lilly of the Dept. of Economic Entomology of the U. of Wisc.

Those who attended the meeting were:

Harvey W. Klein, Klein Exterminating Co., Milwaukee, Wisc.
Howard E. Johnson, Owl Exterminating Co., Racine, Wisc.
Mrs. Howard E. Johnson, Owl Exterminating Co., Racine, Wisc.
Robert Dicke, University of Wisconsin, Madison, Wisc.
Carl Richard, Superior Dept. of Health, Superior, Wisc.
Walton A. Smith, Jr., Riverdale Chemical Co., Harvey, Ill.
Rolan R. Lambert, University of Wisconsin, Madison, Wisc.
Edward Degginger, Julius Hyman Co., Denver, Colo.
Charles Eckert, Janesville Exterminators, Janesville, Wisc.
Miss Vonila Seaver, Seaver Laboratory, Beloit, Wisc.
Russell Tyler, Seaver Laboratory, Beloit, Wisc.
Otto L. Manthie, University of Wisconsin, Madison, Wisc.
C. A. Herrick, University of Wisconsin, Madison, Wisc
Earle S. Hare, University of Wisconsin, Madison, Wisc.
Norman S. Lenz, University of Wisconsin, Madison, Wisc.
Russell G. Clark, University of Wisconsin, Madison, Wisc.
J. Everett Bussart, Velsicol Corp., Chicago, Ill.
John E. Peterson, Dow Chemical Co., Midland, Michigan.
T. J. Derhumes, University of Wisconsin, Madison, Wisc.
C. R. Stull, Rohm & Haas Co., Chicago, Ill.
W. F. Johnson, Chapman Chemical Co., Chicago, Ill.
E. D. Capaga, DuPont Co., Milwaukee Wisc.
J. E. Lee, Westvaco Co., Chicago, Ill.
Lawrence Greenwood, Robertson Exterminating Co., Milwaukee, Wisc.
Verden Greenwood, Robertson Exterminating Co., Milwaukee, Wisc.
Richard Murry, Robertson Exterminating Co., Milwaukee, Wisc.
H. E. Jennings, Smithereen Co., Chicago, Ill.
Ellison Lynn, Lynn Exterminating Co., Rochester, Minn.
W. O. Buettner, Buettner Pest Control Co., Brooklyn, N. Y.
William J. Turrie, Will-Kill Pest Control Co., Milwaukee, Wisc.
Henry Turrie, Will-Kill Pest Control Co., Milwaukee, Wisc.
H. A. Anderson, Milwaukee Health Dept., Milwaukee, Wisc.
Wm. O'Reilly, Minneapolis, Minn.
I. H. Smith, University of Wisconsin, Madison, Wisc.
Martyn O. Ronge, Milwaukee Health Dept., Milwaukee, Wisc.
George Weiss, Milwaukee Health Dept., Milwaukee, Wisc.
Harold J. Olson, Milwaukee Health Dept., Milwaukee, Wisc.
Herbert Matter, Milwaukee Health Dept., Milwaukee, Wisc.
Richard Flynn, Milwaukee Health Dept., Milwaukee, Wisc.
R. C. Evans, Racine Health Dept., Racine, Wisconsin
Morton J. Levy, Twin City Exterminating Co., St. Paul, Minn.
Herbert E. Rogan, Racine Health Dept., Racine, Wisc.
Harry Hammond, Jr., Hammond Pest Control Milwaukee, Wisc.
Carl R. Kozlow, Hammond Pest Control, Milwaukee, Wisc.
Dan J. Murphy, Monsanto Chemical Co., Chicago, Ill.
Alex Last, W. H. Last Pest Control Co., Milwaukee, Wisc.
Robert E. Eron, R. E. Eron Co., Stevens Point, Wisc.
J. H. Lilly, University of Wisconsin, Madison, Wisc.
H. E. Olsen, State Board of Health, Madison, Wisc.
B. G. Berger, Arwell Inc., Waukegan, Ill.
H. S. Sherwood, Arwell, Inc., Waukegan, Ill.
Carl F. Knobla, Knobla's Exterminating Store, Oshkosh, Wisc.
Karl A. Mohr, Green Bay Health Dept., Green Bay, Wisc.
John A. Mock, Arwell, Inc., Waukegan, Ill.
Reuben Eickert, Arwell, Inc., Waukegan, Ill.
George E. Mulloy, Arwell, Inc., Waukegan, Ill.
B. C. Fluke, Pittsburg Plate Glass, Milwaukee, Wisc.
D. P. Lewis, H. D. Hudson Mfg. Co., Chicago, Ill.
J. J. Code., H. D. Hudson Mfg. Co., Chicago, Ill.
T. O. Bugber, City Wausau Health Dept., Wausau, Wisc.
Edward G. Pfiefer, City of West Allis Health Dept., West Allis, Wisc.
H. L. O'Leary, Milwaukee, Wisc.
R. J. O'Brien, Milwaukee, Wisc.
I. C. Baroger, Exito Chemical Co., Eau Claire, Wisc.
C. Paterson, Arwell Inc., Waukegan, Ill.
T. C. Allen, University of Wisconsin, Madison, Wisc.
E. H. Fisher. University of Wisconsin, Madison, Wisc.
Lewis B. Kelly, Solvit Chemical Co., Madison, Wisc.
J. L. Decell, "Pestmaster,", St. Louis, Mich.
Arthur Wolcott, Michigan Chem. Corp., St. Louis, Mich.
E. J. Vaught, Hubbleton, Wisc.
John Emlen, University of Wisconsin, Madison, Wisc.
Patrick H. Maloney, Bay Exterminating Co., Green Bay, Wisc.
Edward R. Friday, Board of Health, Madison, Wisc.
Theodore F. Wisniewski, State Board of Health, Madison, Wisc.
E. J. Tully, State Board of Health, Madison, Wisc.
J. M. Scholl, Madison, Wisconsin
G. A. Hinkle, Cities Service Oil Co., Chicago, Illinois
J. R. Cranklin, Hammond Pest Control Co., Miwaukee, Wisc.
C. O. Partlow, Reliable Exterminating Co., Lafavette, Ind.
J. C. Clarke, Madison, Wisc.
George Hoffman, Ento Pest Control, Chicago, Ill.
H. J. Hammond, Hammond & Sons, Inc., Milwaukee, Wisc.
Frank J. Travino, Wisconsin Health Dept., Madison, Wisc.
S. J. Goldschmidt, Beloit Department of Health, Beloit, Wisc.
H. J. Burger, Health Department, Janesville, Wisconsin
K. P. Backhortz, University of Wisconsin, Madison, Wisc.
T. E. Bronson. University of Wisconsin, Madison. Wisc.
A. Tyre, Kill-All Pest Control, Milwaukee, Wisc.
D. F. Hart, Hotel & Rest. Div. State Board of Health, Wisc.
J. R. Crowthe, Ind. State Veteran Assoc., Madison, Wisc.

DDT, In Test, Spares Fish, Hits Mosquitoes

Knoxville, Tenn.—DDT can be used to prevent mosquito breeding without ill effects on freshwater fish, a report of experiments by the Tennessee Valley Authority indicates in the Journal of Wild Life Management.

Dr. A. D. Hess and G. G. Keener, Jr., TVA mosquito control workers, said that DDT dissolved in a standard commercial solvent, was sprayed by plane over certain areas in the valley's artificial lakes. One-tenth pound of DDT per acre of water surface was released 16 times during the season.

Comprehensive samples were made of the fish and the mosquito larvae and of all water-dwelling insects and other aquatic animal life, many of which are fish food.

At the end of the season, one area yielded 700 pounds of fish per acre, not significantly different from the fish yield from untreated water areas nearby. The spraying was highly effective in keeping down mosquitoes.

The two scientists emphasized, however, that the conclusions do not mean that increased rates of application might not have injurious effects upon fish and fish food organisms.

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Eleventh PCO Conference Held at Purdue

The Eleventh Annual Pest Control Operators Conference was held at Purdue University, Lafayette, Indiana, April 7-11. The total registration of 195 from 20 states and Canada was somewhat less than 1946, which may be accounted for by the fact that heretofore the conference has been held in January, a more favorable time for most operators. There were 75 attending for the first time and five have attended all eleven conferences. They are William O. Buettner, C. Norman Dold, Harlem B. Ives, W. W. Scott, and Jules B. Smith. George L. Hockenyos who has attended all previous conferences was prevented from coming because of an injury.

The Monday (April 7) sessions dealt with the fundamentals of Entomology (structure, biology, insect control and classification), and were handled by members of the Purdue Entomology staff, including J. J. Davis, H. O. Deay, G. E. Lehker, and B. E. Montgomery. Although this first day was intended for those who were present for the first or second time, the number present necessitated dividing the group and repeating the morning and afternoon sessions in both morning and afternoon.

The Tuesday meetings dealt entirely with rodent problems and included talks and demonstrations on Computations for Bait Formulations and Hand and Machine Bait Mixing by Ernest M. Mills of the U. S. Fish and Wildlife Service; Rat Odor Controls by Kenneth N. Cook, Ransford Insecticide Co., Worcester, Massachusetts; Rat Parasites and Their Relation to Health by B. E. Montgomery of Purdue; Procedures of Bait Distribution by Thomas B. Murray, U. S. Fish and Wildlife Service; Experiments with Rat Repellents by Elmer Kuntz, Lien Chemical Co., Chicago, and M. E. McKinney, International Harvester Co., Chicago; and New Ideas in Methods of Rat Control by Galen C. Oderkirk, Milton Caroline and Ernest M. Mills, all of the U. S. Fish and Wildlife Service. Moving pictures and film strip pictures were the features for Tuesday evening.

A new feature - field demonstrations on termite control - was introduced at the Wednesday session, all day being given over to termites and other wood-infesting insects. In the morning three houses were used to demonstrate features of termite control by J. R. Franklin, Hammond Pest Control Co., Hammond, Indiana, Walter S. Gibson, Extermital Termite Service, Lafayette, Indiana, and Charles O. Partlow, Reliable Exterminating Co., Lafayette, Indiana. Equipment was also demonstrated and in the afternoon session the jobs were further discussed, Bernard G. Berger of Arwell, Inc., Waukegan, Illinois, leading the discussion. The Biology and Control of Powder Post Beetles was the subject of an able discussion by Ira Hatfield, Planetary Chemical Co., St. Louis, Missouri. Arthur Ochs, Antimite Termite Proofing Co., St. Louis, Missouri, took care of the subjects. Factors Entering into a Termite Job and Technique in Termite Treatments.

Wednesday evening, unusual features were operator interviews, these being interviews of operator sales and customer resistance, participated in by Harlem Ives, Rose Exterminator Co., Detroit, Lee C. Truman, Arab Pest Control Co., Indianapolis, William Turrie, Wil-Kil Pest Control Co., Milwaukee, Martin Meyer, Theodore Meyer Estate, Philadelphia, and Herman L. Fellton, Orkin Co., Atlanta. These interviews were followed by a very inspiring talk by Professor P. E. Lull of the Purdue Speech Department, who analyzed the interviews with helpful ideas on salesmanship.

Thursday morning included discussions of new insecticides, by authorities as follows: Hexachlorocyclohexane. Carl W. Peterson of DuPont; Chlordane, W. E. McCauley, Julius Hymen Co., Chlorinated Terpene Hydrocarbon, E. N. Woodbury, Hercules Powder Co.; Piperonyl Chclohexenone and Piperonyl Butoxide, William Dickison, Dodge & Olcott; and DDT by George E. Gould, Purdue. A resume of new insecticides was given by L. S. Henderson of the U. S. Bureau of Entomology and Plant Quarantine.

Thursday afternoon included a talk by J. Harvey Sturgeon, President of the National Pest Control Association, entitled The Pest Control Operator-The Applicator. Other subjects discussed included Types of Spray Materials Offered for Pest Control Work, Ira Hatfield, Planetary Chemicals Co., St. Louis; Roach Spraying—A demonstration, William Turrie, Wil-Kil Pest Control Co., Milwaukee; and Hazards Involved in the Application of New Organic Insecticides, Harold Jennings, Smithereen Co., Chicago.

The Annual Dinner was held Thursday evening in the Purdue Memorial Union Building. F. C. Hockema, Vice-President and Executive Dean of Purdue University, was toastmaster. Remarks were made by V. C. Freeman, Associate Dean of the School of Agriculture, Purdue University; J. Harvey Sturgeon, President of the National Pest Control Association; and William O. Buettner, Secretary of the National Pest Control Association. The program was concluded with Riley poems by a Riley authority and interpreter, George E. Davis, Director of Student Affairs, Purdue University. One hundred dollars was added to the $200.00 given last year for Adult Education Building Fund and over four hundred dollars to the PCO Research Fund, which now totals $1640.00.

The Conference concluded its program Friday morning with a talk by Willis N. Bruce, Illinois Natural History Survey, Urbana, Illinois, on the subject, Comparative Residual Toxicity of New Organic Chemicals. This was followed by a discussion of Flies of Importance in Barn Spraying by J. J. Davis of Purdue and an explanation and demonstration of barn spraying with DDT by Virgil R. Knapp, Entomological Service and Supply Co., Zionsville, Indiana, and an explanation and demonstration of weed control with 2,4-D by O. C. Lee, Weed Specialist of Purdue University.

Eleventh PCO Conference Registration
April 7-11, 1947
Purdue University, Lafayette Indiana

Anne G. Anderson, Anderson Ext. Co., Chicago, Ill., Earl A. Anderson, Anderson Ext. Co., Chicago, Ill., C. H. Baase, Extermital Termite Control, New Castle, Ind., E. W. Bankston, American Cyanamid Co., Madison, Wisc., Richard K. Barnett, Barnett's Pest Control, Dayton, Ohio, Mrs. Richard K. Barnett, Barnett's Pest Control, Dayton, Ohio, Wm. K. Barnett, Barnett's Pest Control, Dayton, Ohio, L. C. Baxter, Baxter Ext. Co., Anderson, Ind, Betty Benmosche, Evins Ext. Co., New York, N. Y., Jack Benmosche, Evins Ext. Co., New York, N. Y., John F. Benham, Nat'l Sprayer and Duster Ass'n., Chicago, Ill., James V. Benschoter, Ben-E-Lene Exterminator, Toledo, Ohio, B. G. Berger, Arwell, Inc., Waukegan, Ill., Howard Berger, Barnett's Pest Control, Dayton, Ohio, E. Allen Biddle, Biddle Exterminators Blytheville, Ark., A. D. Bosely, A. D. Bosely Co., Indianapolis, Ind., Robt. C. Bour, Riverdale Chem. Co., Harvey, Ill., Ed Breed, Peoria Pest Control, Peoria, Ill., J. Bridges, Arnold Exterminators, Cincinnati, Ohio, C. L. Brookstra, Brookfield Pest Control, Davenport, Iowa, Willis N. Bruce, Ill. Nat. Hist. Survey, Urbana, Ill. V. A. Bryant, W. B. McCloud & Co., St. Louis, Mo., T. Frederick Boyd, American Cyanamid Co., Lafayette, Ind., Wm. O. Buettner, Nat'l Pest Control Assn., Brooklyn, N. Y., Hugo, Burgel, Capital City Ext. Co., Columbus, Ohio., A. W. Burr, Superior Ext. Systems, Rockford, Ill., Albert G. Bushouse, A-B Ext. Service, Kalamazoo, Mich., J. E. Bussart, Velsicol Corp., Chicago, Ill., Harold Campnell, Arab Pest Control, Lima, Ohio, I. B. Carncross, Syracuse Chemical Co., Syracuse, N.Y., Leslie Casali, Peoria Pest Control, Peoria, Ill., Evangelos Catsioulas, Spyre Sanitary Pro-

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Dooley, John Powell & Co., Chicago, Ill., Amos Douglas, Barnett's Pest Control, Dayton, Ohio, Kenneth H. Draper, Draper Ext. Co., Indianapolis, Ind., Robt. Ebert, Smithereen Co., Chicago, Ill., Calvin L. Edmondson, Acme Pest Control, Cincinnati, Ohio, Carl E. Eichstedt, Extermital Chemical Co., South Bend, Ind. Bartlett W. Eldredge, Waltham Chemical Co., Waltham, Mass., R. P. Ellerbusch, Federal Public Housing Authority, Ann Arbor, Mich., Geo. R. Elliott, Ransford Insecticide Co., Worcester, Mass., W. F. Elsholz, International Harvester Co., Chicago, Ill. K. C. Emerson, Angola, Ind. W. F. Exner, Termite Control Co., Webster Groves, Mo., Herman L. Fellton, Orkin Ext. Co., Atlanta, Ga., Ray Fisher, Extermital Termite Service, Hartford City, Ind., J. A. Fowler, Louisville Chem. Co., Louisville, Ky., J. R. Franklin, Hammond Pest Control Co., Hammond, Ind., Chas. E. Gerkepott, Termite Control, Dillsboro, Ind., Geo. L. Gargis, Continental Exterminators, St. Joseph, Mo., Walter S. Gibson, Extermital Termite Service, W. Lafayette, Ind., J. R. Glatthoar, Monsanto Chem. Co. , Collingsville, Ill., Harry B. Gouse New England Pest Control Co., Providence, R. I., Ted Grembowicz, Smithereen Co., Chicago, Ill., Alvin F. Haack, Extermital Chemical, Michigan City, Ind., Joe W. Hahne, Smith Ext. Co., Omaha, Nebr., Wm. Harbaugh, U. S. Army, Rantoul, Ill., I. Hatfield, Planetary Chemical Co., Creve Coeur, Mo., L. S. Henderson, Bureau of Entomology & Plant Quarantine, Washington, D. C., R. E. Herod, Pest Control Clinic, Hamilton, Canada, Leonard R. Hill, Laing Ext. Co., Bedford, Ohio, Robt. J. Hinderliter, Arab Pest Control, Columbus, Ind., Jack Hodge, Breth-O-Deth Laby's, Grand Rapids, Mich., Edwin A. Hollatz, Rose Ext. Co., Detroit, Mich., Martha Hoover, Arnold Exterminators, Cincinnati, Ohio, Don Humphreys, Arab Pest Control Co., Lima, Ohio, Geo. T. Hunter, Hunter Pest Control Service, Ft. Wayne, Ind., H. R. Isherwood, Antimite Co., St. Louis, Mo., Harlem B. Ives, Rose Exterminator Co., Detroit, Mich., H. E. Jennings, Smithereen Co., Chicago, Ill., M. H. Johnson, Extermital Chemicals, Benton Harbor, Mich., H. B. Jordan, Arab Pest Control Co., Indianapolis, Ind., Bert Julian, Arab Pest Control Co., Indianapolis, Ind., S. H. Justice. Noxx Chemicals, Columbus, Ohio, C. W. Kearns, Illinois St. Nat. Hist. Survey, Urbana, Ill., Orlas King, Barnett's Pest Control, Dayton, Ohio. Ellsworth G. Klein, Klein Pest Control Co., Milwaukee, Wisc.. Virgil R. Knapp, Entomological Service & Supply Co., Zionsville, Ind., Glen E. Kniffen, Illini Pest Control, Urbana, Ill., Elmer A. F. Kuntz. Lien Chem. Co., Chicago, Ill.. Stephen Kurtis, Kurtis Ext. Co., Ann Arbor, Mich., Chas. V. Kyle, Extermital Chemicals, Dayton, Ohio, L. H. Large, Valparaiso Pest Control, Valparaiso, Ind., Harry Larson, Robertson Ext. Co., Milwaukee, Wisc., Bert Lewis, Lewis Pest Control, Muncie, Ind., David P. Lewis, Hudson Mfg. Co., Chicago, Ill., I. E. Linderman, Indiana S. Bd. Health, Indianapolis, Ind., John P. Linn, Industrial Pest Control Co., Omaha, Nebr., John E. Loges, Arab Pest Control, Terre Haute, Ind., Wm. W. Lustfield, Brookfield Pest Control Co., Davenport, Iowa, Geo. H. McCarthy, American Cyanamid Co., Trenton, Mich., Thos. W. McClout, W. B. McCloud Co., Oak Park, Ill., W. E. McCauley, Julius Hyman & Co., Denver, Colo., D. L. McCullough, Sanitary Ext. Co., Williamsport, Pa., James J. McDaniel, International Ext. Co., Chicago, Ill., M. E. McKinney, International Harvester Co., Villa Park, Ill., Donald J. McLeod, McLeod Industrial Fumigators, Buffalo, N. Y., Shirley McLeod, McLeod Industrial Fumigators, Buffalo, N. Y., Martin T. Meyer, Theodore Meyer Est. Philadelphia, Pa., Herman C. Militzer, H. & M Laboratories, Toledo, Ohio, Carroll P. Miller, Wayne Exterminating Co., Fort Wayne, Ind., Clyde T. Miller, Cyanamids Gas Co., Fort Wayne, Ind., E. M. Mills, U. S. Dept. of the Interior, New Brunswick, N. J., Carl O. Mohr, Ill. Nat. Hist. Survey, Urbana, Ill., J. J. Mooney, Columbus, Ohio, Leon A. Moore & Co., Utica, N. Y., Betty Morris, Arnold Exterminators, Cincinnati, Ohio, W. J. Morris, Arnold Exterminators, Cincinnati, Ohio, T. B. Murray, U. S. Fish & Wildlife Service, Chicago, Ill., Harvey Neal, Extermital Termite Serv., Lafayette, Ind. Lewis E. Norman, Smithereen Co., Chicago, Ill., Arthur Ochs, Antimite Termite Proofing Co., St. Louis, Mo., Chas. T. O'Hara, Monroe Labry's, Chicago, Ill., Julian Oser, Oser Ext. Co., Denver, Colo., Maurice Oser, Oser Ext. Co., Denver, Colo., C. O. Partlow, Reliable Ext. Co., Lafayette, Ind., Kaspar Peter, American Cyanamid Co., Toledo, Ohio, Carl W. Peterson, E. I. Du Pont, de Nemours and Co., Chicago, Ill., Chas. G. Pettit, Sr., Corn Products Ref. Co., Pekin, Ill., N. S. Philippi, Chas. Denny & Co., Webster Groves, Mo., Wm. Phippard, Wilmar Co., Cincinnati, Ohio, N. Piesbergen, Monsanto Chem. Co., St. Louis, Mo., O. L. Potter, Potter Pest Control Serv., Ecourse, Mich., Morton S. Prescott, Protex Service, Chicago, Ill. A. W. Price, W. B. McCloud & Co., Chicago, Ill., J. F. Pryor, Corn Products Refining Co., N. Kansas City, Mo., E. H. Purcell, E. H. Purcell & Co., Fort Wayne, Ind., J. L. Purdy, Extermital Serv., Hamilton, Ohio, Meyer M. Reisman, Stone Chem. Labrys., Chicago, Ill., Arthur H. Richards, A. H. Richards & Sons, Wilkes Barre, Pa., Ted Riedelburg, Westvaco Chlorine Products Corp., New York, N. Y., W. R. Robertson, Louisville Chem. Co., Louisville, Ky., Wm. E. Roll, American Disinfectant Co., Washington, D. C., Lavonne R. Rukin, Industrial Fumigant Co., Chicago, Ill., G. L. Russell, Hudson Mfg. Co., Chicago, Ill., Fred J. Sackriter, Stone Chemical, Laboratories Co., Chicago, Ill., D. W. Sanderson, Reliable Exterminators, W. Toronto, Canada, W. W. Scott, Arwell, Inc., Waukegan, Ill, Myron Sempliner, Eradico Products Co., Detroit, Mich., Edw. Shoemaker, Ace Pest Control, Dayton, Ohio, Jules B. Smith, A-Veri-Best Exterminators, Chicago, Ill., Julius S. Smith, Eradico Products Co., Detroit, Mich., George Spellios, General Ext. Co., Indianapolis, Ind., John K. Spyre, Spyre Sanitary Products, Detroit, Mich., H. K. Steckel, Tornado Mfg. Co., Columbus, Ohio, Richard Stover, B & B Exterminators, Baltimore, Md., J. Harvey Sturgeon, Sturgeon Pest Control Louisville, Ky., Ray R. Terrell, Arab Pest Control, Springfield, Ohio, Jack Thomas, Antimite Co., Charleston, Ill., Jack E. Thompson, General Exterminating Co., Erie, Pa., Lee C. Truman, Arab Pest Control, Indianapolis, Ind., W. R. Tryke, Smithereen Co. S. Holland, Ill., Wm. J. Turrie, Wil-Kil Pest Control, Milwaukee, Wisc., Vern V. Walls, Modern Ext. Co., Cedar Rapids, Iowa, C. C. Warnock, 300, Plymouth, Ind., Wm. R. Warthen, Vogel-Ritt of Ohio, Cincinnati, Ohio, Jos. A. Watkins, Vogel-Ritt, Inc., Detroit, Mich., Ernest Whitaker, L. A. Moore & Co., Utica, N. Y., Carl L. Whitson, Orkin Ext. Co., Little Rock, Ark., L. L. Wicker, Nat'l Ext. Co., Kansas City, Mo., T. F. Winburn, Industrial Fumigant Co. Chicago, Ill., W. W. Windmeier, Airway Ext. and Products Co., Chicago, Ill. Mark A. Wolf, Dorn Chemical Co., Midland, Mich., E. N. Woodbury, Hercules Powder Co., Wilmington Del., Robt. E. Zimmerman, Hygienic Sanitation Co., Altoona Pa., O. Cleon Brown, Arab Pest Control Co., Dayton, Ohio.

Milton Caroline, Asst. District Agent, U. S. Fish & Wildlife Service, Lafayette, Ind., Geo. E. Davis, Director of Student Affairs, Lafayette, Ind., J. J. Davis, Head, Dept of Entomology, Lafayette, Ind., H. O. Deay, Associate Professor of Entomology, Lafayette, Ind., D. C. Freeman, Associate Dean School of Agriculture, Lafayette, Ind., G. E. Gould, Associate in Entomology, Lafayette, Ind., Frank C. Hockema, Executive Dean & Vice-President, Lafayette, Ind., O. C. Lee, Weed Specialist, Lafayette, Ind., G. E. Lehker, Extension Entomologist, Lafayette, Ind., P. E. Lull, Prof. of Speech, Lafayette, Ind., B. E. Montgomery, Associate Professor in Entomology, Lafayette, Ind., G. C. Oderkirk, District Agent, U. S. Fish & Wildlife Service, Lafayette, Ind.

Of Mice and Englishmen

Mouse breeding in England is serious business, Jane Carruthers writes in This Month Magazine. In England there is a magazine called "Mouse Monthly," she discloses, and before the war over 1,000 Britishers were breeding fancy mice and at least once a week they held a mouse show. To some English mouse fanciers mice "are objects of tender passion," Miss Carruthers says. Others breed them because mouse fur coats are popular in England. The English, who "will race anything," the author comments, are also enthusiastic mouse racers.

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1 pt. makes 2 gal. of 2% emulsion when mixed with water

1 GAL.	8.75 GAL.
5 GAL.	8.50 GAL.
55 GAL. DRUM	8.00 GAL.
ONE DOZ. PT. BOTTLES	13.50

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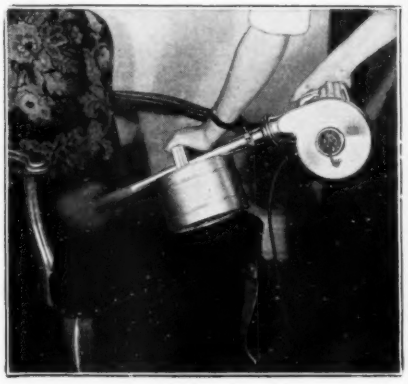

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LOCAL ORGANIZATION NEWS

Connecticut and NEPC Associations

A combined meeting of the Connecticut and the New England Pest Control Associations was held at Province, R. I. on April 3, 1947. J Edwin Sameth,Regional Vice-President of the National Pest Control Association, was the speaker of the evening. To the seventy-five who attended, Mr. Sameth made two principal points. He suggested that local groups such as ours hire a Sanitarian to work with each member firm as needed. He also stressed the need of training the service men to do a standardized service job. Also, he suggested employing an institute to publicize the Pest Control Industry.

"Bill" Buettner also made the trip and spoke in favor of passing more information on to the service men. He pointed out that the service man is the personal contact with the public and that the firm is judged by what the service man knows and how he acts.

Two new members were accepted into membership of the New England group. They were: Robert Cotter of the A. P. Lynch Co. of Somerville, Mass., and W. J. Mongeau of the Pied Piper Service Co. of Farnumsville, Mass.

George B. Lay told of his new job with the United States Army. He is scheduled to leave shortly for Korea where he will work on rodent and insect control.

"Bart" Eldredge spoke on the plans to hold the 1950 National Convention in Boston. Those present voted unanimously to support the move.

The local details of the program had been arranged by Leonard Y. Goldman. He presented Miss Evelyn Hamilton, accordionist and singer, and Elmer Shakeshaft, pantomime artist.

Lester Bureau, president of the Connecticut Association, invited everyone to attend their dinner meeting at the Bond Hotel. Hartford, on April 22nd.

Lester M. West president of the New England group presided.

Those who attended the joint meeting were:

D. F. Mason, Mason Exterminating Co., West Haven, Conn.
C. F. Barbour, DDT Service Co., West Haven, Conn.
R. M. Houghton, Safety Fumigant Co., Boston
C. W. Houghton, Safety Fumigant Co., Boston
T. J. Ledwith, Berg Exterminating Co., Hartford
F. Haas, Aetna Exterminating Co., Hartford
Harold Levine, Keystone Exterminating Co., New Haven
John Duncan, New Haven
Andy Anderson, Berg Exterminating Co., Hartford
Joseph A. Putinski, New Britain, Conn.
Joseph Messina, Cambridge Exterminating Cambridge, Mass.
A. Bain, N. E. Exterminating Co., Lowell
A. Kaplan, N. E. Exterminating Co., Lowell
George W. Dyar, Rose Exterminating Co. Hartford
Grace E. Dyar, Rose Exterminating Co., Hartford,
Walter C. Johnson, Griggs & Browne Co., Worcester
Thomas Hande, Griggs & Browne Co., Worcester
Leslie F. Jones, N. E. Pest Control Co. Providence
George Ford, Griggs & Browne Co., Worcester
Charles Smith, Griggs & Browne Co. Providence
H. Bain, N. E. Exterminating Co., Lowell
S. Heald, Griggs & Browne Co., Providence
W. J. Mongeau, Pied Piper Service, Farnumsville
E. B. Haden, Jr., Pied Piper Service, Farnumville
A. A. Mongeau, Pied Piper Service, Providence
F. Packham, Earl W. Taylor & Co., Providence
W. L. Taylor, Earl W. Taylor & Co., Providence
R. H. Pelletier, Ideal Spray Co., Lynn
M. E. Robbins, Ace Sanitation, Springfield
Mrs. Betty Robbins, Ace Sanitation, Springfield
Constantio Comoglis, Destro Co., Springfield
R. M. Cook, Ransford Insecticide Co., Worcester
D. A. Weisburger, B & D A Weisburger Co., New York City
Herbert Myer, Fumex Sanitation Co., Jamaica, N. Y.
J. Newman, Newman Chemical Co., Holyoke
Sidney Wimmer, Majestic Exterminating Co., Inc., New York City
E. Pigeon, Excel Exterminating Co., Providence
A. Bacchi, American Exterminating Co., Everett
Andrew Mc A'Nulty, AAA Exterminators
Paul Lacy, American Exterminating Co., Everett
James Mc A'Nulty, AAA Exterminators Co. Boston
Co., Boston
George W. Small, Ransford Insecticide Co., Worcester
George B. Lay, Hopkinton
A. P. Lynch, A. P. Lynch Co., Somerville
Joseph Fleisher, Astor Exterminating Co., Boston
Mark Weintraub, Astor Exterminating Co., Boston
Louis Weintraub, Astor Exterminating Co., Boston
Morris Schwartz, State Exterminating Co., Boston
S. H. Morrison, Liberty Laboratories Corp., Boston
Charles J. Hackley, Mattapan Insecticide Co., Boston
Walter J. Mugford, Mattapan Insecticide Co., Boston
Neeley Turner, Conn. Experimental Station, New Haven
F. W. Hand, Todd Shipyards, Pawtucket
N. McDonald, Todd Shipyards, New York City
Hart Harris, Jr., S. B. Penick & Co., Boston
R. A. Urbano, Portland Exterminating Co., Portland, Me.
Harry B. Gouse, N. E. Pest Control Co., Providence
F. B. Hines, Ace Exterminating Co., Salem
Edward G. Maguire, William A. Maguire Co., Haverhill
T. E. Burd, Waltham Chemical Co., Waltham
C. H. Corey, Waltham Chemical Co., Waltham
M. A. Nugent, Jr., Waltham Chemical Co., Waltham
R. C. Yohston, Waltham Chemical Co., Providence
W. L. Starbird, Puritan Specialty Co., Cambridge
J. Harrie Burdge, Portland, Me.
F. E. Bohman, Birchard System, Inc., Hartford
L. A. Bureau, ABC Exterminating Co., New Haven
G. R. Elliott, Ransford Insecticide Co., Worcester
W. O. Buettner, National Pest Control Association, Brooklyn
Lester M. West, Rose Exterminator Co., Boston,
J. Edwin Sameth, Western Exterminating Co., Newark, N. J.
Leonard Y. Goldman, N. E. Pest Control Co., Providence
Charles N. Egan, Trinity Exterminating Service. E. Hartford
Kenneth N. Cook, Ransford Insecticide Co. Worcester
Bartlett W. Eldredge, Waltham Chemical Co., Waltham

New Book Just Out

FLEAS OF WESTERN NORTH AMERICA, by C. Andresen Hubbard, 532 pages, 93 plates illustrating 236 species, cloth bound ($6.00).

This new book describes individually 66 genera and 236 species of Fleas inhabiting Western North America including one new genus and several new species. It defines the range of each species, comments on medical importance, if any control measures, lists records and, for many species, briefly discusses the biology.

A full chapter is devoted to discussion of the medical importance of fleas. Their role as transmitters of bubonic plague, human typhus, and tularemia is fully treated.

Ninety-three plates carefully prepared by the author, illustrate clearly the distinguishing characteristics of each of the 236 species.

Honolulu's PCO's Organize

On March 7, the Honolulu PCO's met and organized under the name of Hawaiian Pest Control Association.

The new industrial group has adopted the code of ethics of the National Pest Control Association, Inc. It will serve to render the public the highest practices of their industry.

Charter officers and directors chosen include S. K. Murakami, Terminex Wood Treating & Contracting Co., Ltd., chairman; Benet Costa, Kills 'Em Chemical Co., Ltd., vice chairman; E. L. Forde, Chemtox Co., secretary-treasurer; H. C. Hilts, Hilts Laboratories, Sung Hin Au and Lawrence Gay, directors.

The new group is assisting the legislature in its passage of a pest control bill, aimed at licensing the territory's pest con-

trol operators.

It will also initiate an educational program to better acquaint the populace with Hawaii's pest problems

Those who attended the meeting were:
H. C. Hilts, Hilts Laboratories
Benet Costa, Kills 'Em Chemical Co.
E. L. Forde, Chemtox Company
D. H. Warner, Chemtox Company
G. E. Bushnell, Jr., Chemtox Co.
S. K. Murakami, Terminex Co.
C. J. Koto, Hawaii Termite Fum. Co.
D. Nishimura, Chem-pure Co.
H. Asato, Chem-pure Co.
Horace Joyce,
Lawrence Gay
Sung Hin Au

Professional Exterminators Association

Highlight of the PEA meeting, held on Monday evening, April 14, at the Commodore Hotel, N. Y., was the showing of the Rohm & Haas' technicolor sound film, "Our Constant Enemy—The Insect." Describing life habits and control of industrial, home and agricultural pests, the picture proved of timely, topical and instructive interest.

A short business and technical session followed with Joe Finneman presiding. Al Friedman was appointed chairman of the Membership Committee. Philip Haller, Virus, Ltd., Inc., N. Y., and Alvin M. Weiss, Tri-Boro Exterminating Co., N. Y., were admitted to membership in the Association. Considerations involving correct procedure in the purchase of 1080 were discussed.

Meeting Postscript

Several, including Sol. Farrell, who incidentally did a most professional-like job of running the film off, adjourned to a nearby cafeteria after the meeting. There, over "coffee and doughnuts," problems, professional, national and international, were put to rights.

Dr. Weed Addresses EPPCA

A highly informative talk on "New Insecticide Developments," with special emphasis on pyrethrum, 666 (benzenehexachloride) and DDT, was given by Dr. Alfred Weed, of the John Powell Co., N. Y., before the Eastern Pennsylvania Pest Control Association at the Benjamin Franklin Hotel, Philadelphia, on March 11. A lengthy quiz program followed with Doctor Weed and William O Buettner on the receiving end. Martin Meyer presided.

The remainder of the evening was devoted to matters of business interest, such as committee reports, preparatory details in connection with the forthcoming annual convention of the NPCA, etc. Among the convention needs reviewed were booth and advertising charges, entertainment, panel of speakers, etc.

The following firms were admitted to membership: A. F. McNeill, Uwchland, Chester Co., Pa., and P. S. Rodman, Strong Extermall Laboratories, Wilmington, Del.

A. E. Ritt was voted a director and Karl W. A. Beckman treasurer of the Association.

Contributions to the Memorial Fund for John Vogel at Penna. State College were asked. Mr. Ritt reminded the assembly that March 11, the day the meeting was being held, Mr. Vogel would have celebrated his 56th birthday.

The Penn-Harris Hotel, Harrisburg, will be the scene of the next meeting on June 10. A speaker from the Department of Supplies & Purchases, to discuss treatment of bedding and upholstery, was suggested by Mr. Meyer. It is expected that Harold Jennings, Chairman of the National Convention Committee, will attend.

A group dinner preceded the meeting.

Bob Hope

Hello, is that you, Colonna? Is that you, Colonna?

No. This is J. Colonna. I have an uncle whose name is U. Colonna, but he's in Africa now, hunting ant-eaters. He wants to bring one back alive.

Your uncle wants to bring back an ant-eater? Why?

Hates my aunt.

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3. NO EXPENSIVE APPLICATORS —Simply pour Larvacide on a few burlap bags strategically placed according to directions—or use a sprayer if convenient. No muss, no bait mixing, no fuss.

4. ECONOMICAL TO USE —As little as 2-2½ lbs. of Larvacide per 1,000 sq. ft. of floor area is all you need to control rodents. Volatilizes quickly.

5. LESS DANGER TO HUMANS —Larvacide evaporates into a tear gas. You get plenty of warning before Larvacide can harm you.

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Larvacide—in handy 1 lb. size—makes a perfect fumigant to carry wherever you go. A few cans in the back of your car or truck and you are ready for any unexpected small fumigations job—anywhere, anytime. No bulky equipment to carry—no chemicals to mix. The Larvacide can opens easily with any ordinary can opener.

Larvacide, tear gas fumigant, comes in handy 1 lb. dispenser bottles, each in sealed can, 12 to wooden case, or in cylinders of 25, 50, and 180 lbs. Trade discount for 3 cases, or 100 lbs. in cylinders, or more. Write for interesting, descriptive folder giving uses, dosages and many pertinent facts about this effective modern fumigant.

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FORMULA: 3.55% Organic Thiocyanates (5½% Lethanes 60 and 384) with 0.03% Aromatics in Gulfspray odorless-type insecticide base oil. Guaranteed Grade AA Spray as is.

Add 1068 or DDT, etc., as required for your special service uses.

Available supply is large; probably sufficient for operators' full 1947 season use.

Delivery from Gulf warehouses in Texas, Arkansas, Tennessee, Kentucky, Indiana, Michigan, and all states East.

YOUR PRICE

24/1-pint cans or bottles	$1.20 per case*
12/1-quart bottles	1.00 per case*
24/1-quart cans	2.00 per case*
6/1-gallon cans	1.84 per case*
11/5-gallon pails	1.25 each**
55-gallon drums ($4.00 drum deposit)	.25 per gal.**
Tank Cars (F.O.B. Port Arthur, Texas; ½ freight allowed)	.18 per gal.

*Where merchandise is not available locally, Gulf will pay ½ the freight from shipping point.

**Delivered in above outlined territory, also the states of Illinois, Wisconsin, Minnesota, Oklahoma and Missouri.

As this merchandise is offered "for use," not resale as Gulfspray, labels will be removed from bottles. Title panels of cans and pails will be "painted out."

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This is just one out of the many unsolicited letters we are constantly receiving proving the effectiveness of "TOX-EOL."

"TOX-EOL" **Toxic base is chlorinated phenol plus. Is economical and not unpleasant to use. Effective for both wood and soil poisoning. Present cost less than creosote. Shipped in a highly CONCENTRATED liquid saving transportation charges.**

Send today for advertising and dealer co-operation plan.

CRE-O-TOX CHEMICAL COMPANY

Pioneers in the use of Chlorinated Phenols for termite control.

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Efficient

MOSQUITO TRAP

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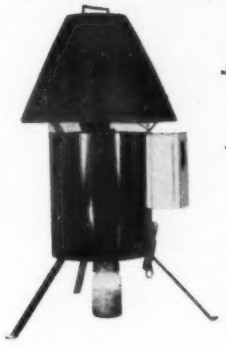

This new portable Mosquito Trap proves highly satisfactory in mosquito control work. Enables you to get the mosquito count **easily** and **accurately.** Unit is 30" high x 15" diameter. Operates on 110 volt 60 cycle current. Complete with 6 ft. cord. Built for years of duty in mosquito surveying. Timer can be set for any period of time, day or night. Made of aluminum, painted forest green. Has small screen to keep out other night flying insects. Weatherproof . . . fully insulated. Write for prices and more detail.

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Phosphorous, however, remains basic in the compound because it is the most toxic chemical used in pest exterminating, being more toxic than arsenic, strychnine or thalium. Approximately one-tenth of a grain will kill a rat. Phosphorous is a slow poison, taking from 6 to 18 hours to kill. Due to its slow but positive action, the rat succumbs to this poison. He becomes very uncomfortable and, seeking fresh air and water, in most cases, leaves the premises and dies in the open.

For all species of roaches, this product is **UNEXCELLED.**

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Against Chemicals, Wet or Dry

Edmonts are ideal for handling insecticides and other chemicals used in fumigation and extermination. Also full protection against dirt and contaminated articles. Tougher and longer-wearing than ordinary rubber gloves, they resist snags and tears, are easier on and off. Inside is soft, cotton fabric, outside is Neoprene rubber which is fully resistant to oil and aqueous base solutions. Wear them for complete safety. Sold by leading industrial and safety equipment suppliers.

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WHAT'S NEW IN PEST CONTROL-PERSONALS

H. T. McGILL of Houston, Texas, Manufacturer, Distributor of Industrial Fumigation Equipment and Supplies has moved into larger quarters. The address is 3614 Burch St. Best wishes.

Because of the increased business, the **NORTHWEST EXTERMINATING CO.** of New Orleans, La., has moved into their new and larger quarters, 1209-11 Carondelet St. Best wishes.

Norman Miles Oberlander

Fred L. Oberlander of Bond Exterminating Co., Jamaica, N. Y, writes: "Please be advised of the arrival of a new apprentice named Norman Miles, weighing in at 6 pounds, 4 ounces, on Sunday morning March 23rd, and that both mother and dad are doing fine."

Congratulations and best wishes, Fred.

George B. Lay

Things have taken an extremely peculiar turn, writes George Lay. He has accepted a position with the government as a consultant on matters pertaining to insect and rodent control as they affect sanitation and health.

George has left for Korea and will be gone for about two years. Before he decided to enter business for himself, he was asked to fill out a Federal application Form regarding the position and as George puts it: "The chance was one in a thousand and I got it. I don't know why!"

If nothing prevents, we expect to hear from George from time to time. We shall receive some very interesting items providing he is not debarred from writing factual items. Best wishes, George!

MM & R Acquires New Warehouse

Magnus, Mabee & Reynard, Inc., announces occupancy of a seven story fireproof, concrete and steel warehouse running from 15 Vestry Street to 36 Laight Street in New York. The newly acquired property (warehouse No. 3) increases by 35,000 square feet the space devoted to Magnus, Mabee & Reynard's ever-expanding storage need. The new warehouse represents the fourth expansion since Magnus, Mabee & Reynard has moved to its present quarters at 16 Desbrosses Street, New York.

Per-Mo Flameproof Liquid

A color circular discussing Per-Mo Flameproof Liquid can be had by writing to Per-Mo Products Co., Kansas City 6, Mo. The firm states that they are receiving inquiries as well as orders. Some desire to know more about the product so we shall quote a recent letter from Kansas City Fire Prevention Division. "Fabrics properly treated with Per-Mo Flameproof Liquid in accordance with manufacturer's direction will be acceptable wherever this office recommends flameproof materials, provided such fabrics are for interior use and not exposed to the weather."

New Film: "Our Constant Enemy—the Insect"

Release of the Rohm & Haas motion picture, "Our Constant Enemy—the Insect," marks the completion of a project which had long been planned to fill a recognized need in household, agricultural, and industrial insect control operations. Rohm & Haas has consistently stressed the importance of educational work in the development of efficient insect control methods. The new film is another step in this educational program.

Three Fronts

The picture shows that the war on insects may have three fronts, the home front, the agricultural front, and the industrial front. On the home front, flies, mosquitoes, roaches, and clothes moths are probably the most persistent pests. Modern methods of exterminating these insects are shown in the film. Dramatic "life cycle" pictures of the fly and mosquito, and death struggles of cockroaches poisoned in the company's insecticide evaluation laboratory, are especially effective.

The farmer, on the agricultural front, finds fantastic numbers of seemingly endless varieties of insects pitted against him. He must be able to identify the insect and its type—whether of a chewing or sucking variety—in order to choose the proper control measures. The natural color "close-ups" of insects shown in the film are among the most striking features of the picture.

The methods and equipment used by the PCO in industrial insect problems are pictured in typical operations such as are encountered in various kinds of food processing plants.

Natural Color Throughout

"Our Constant Enemy—the Insect" is a sixteen millimeter film photographed throughout in natural color. Although most of the picture deals with insect pests, some footage is devoted to related subjects of bacteria control and plant disease. Showing time for the picture is 32 minutes. The film may be obtained by organizations interested in insect control by writing to Rohm & Haas, Dept. P, (P), Philadelphia, Penn. for schedule and other details.

"Wood Garden" Produces Money Crop

Test plots like the picture shown below is maintained in Jacksonville, Florida, since 1935 by the Chapman Chemical Company, 333 North Michigan Avenue, Chicago, Ill., uncover important facts about wood preservation. Modern techniques for protection of wood from moisture, fungi and insect damage, were developed from data produced by such samples. End results is the addition of years to service life of telephone poles and crossarms, fence posts, millwork, structural timber and a host of other lumber products. This added service represents annual savings to American wood users of millions of dollars.

Innis, Speiden & Co. Announcement

The Insecticide Division of Innis, Speiden & Co., 117 Liberty Street, New York City, this month announced the development of a new and improved soil applicator designed specifically for the rapid and complete application of Larvacide, tear gas fumigant, in soil fumigation work.

The new applicator, the company has announced, is in the process of manufacture and will be available for the trade shortly.

Shown above discussing plan details of the new applicator are: **left to right:** Conrad C. Johnson, Manager Insecticide Division, P. L. Frost (standing) Manager of Sales, Eben C. Speiden, Vice President in charge of Production Isco Chemical Division and Director.

Chemicals

Insecticides—The outlook for insecticide supplies in 1947 is little brighter than during 1946, because of raw materials shortages and transportation problems. However, increased output is under way and low inventories existing at the end of 1946 are being built up. Over-all supplies will undoubtedly furnish adequate protection for crops during the coming season. However, some materials in plentiful supply may have to serve as substitutes for scarce commodities.

The rotenone situation has improved considerably, with supplies at the highest point since early 1942. In spite of recent speculative buying in Peru, United States firms have been able to purchase a goodly amount

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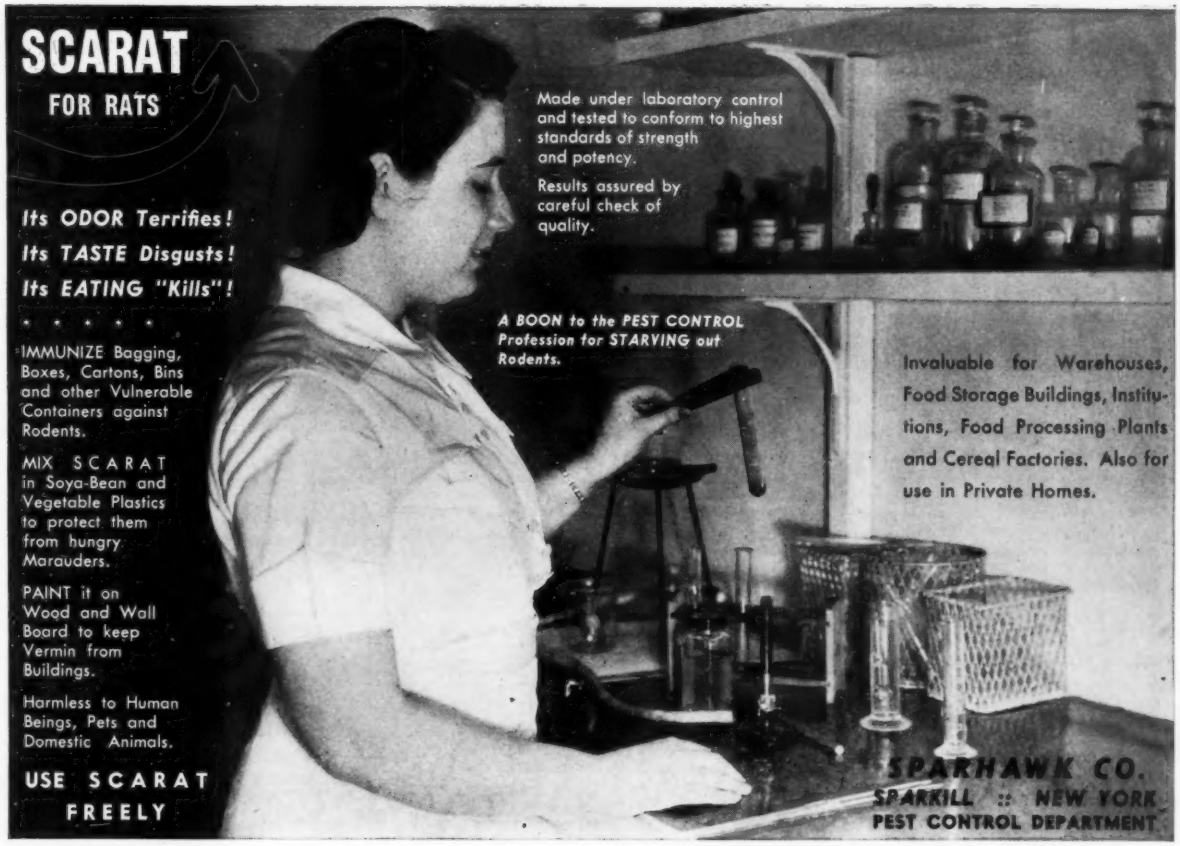
FOR RATS



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Protextile is in full compliance with the requirements of the California State Fire Marshal.

We also manufacture a complete line of fire retardants for the treatment of textiles, lumber and wood products.

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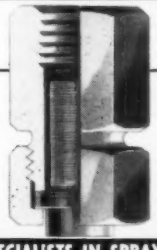

For Residual Spraying of Insecticides

Spray nozzles ¼T-8001, ¼T-8002, ¼T-50015, and other sizes provide a flat spray pattern of uniform density for effectively spraying insecticides such as DDT in residual spraying applications. Distribution is equalized ... spray is free of streaks. These are the nozzles that are standard for industry.

SPECIALISTS IN SPRAY NOZZLE DESIGN AND MANUFACTURE

of cube root and arrivals at New York during December and January were heavy. Pyrethrum has been a bright spot in the insecticide picture for about a year with full indication of plentiful supplies for 1947. Ample stocks will permit its use in place of materials in short supply.

DDT production is unable to keep pace with demand and output is sold well ahead. This situation is caused by a shortage in raw materials, not lack of manufacturing capacity. The world shortage of nicotine will continue throughout 1947. Other commodities in the insecticide field, with the exception of coal-tar products, are in good supply and undoubtedly demand will be met.

TEP

TEP (tetraethyl pyrophosphate): Reports indicate this material may be of possible interest as an insecticide and perhaps as a rodenticide. "It is not," however, "in more than preliminary stages of investigation. It is dangerous to all animals and hence is limited in usefulness. It is unstable in water solution." Until more information is forthcoming, experimentation with it on the part of the PCO is **NOT** recommended by authoritative sources.

Chemical Names Recorded

The Commissioner of Patents has advised the Department under date of March 4 of the recordation of the names **Chlordane** and **Technical Chlordane** in the Trade-Mark Division of the Patent Office as of February 27, 1947. Products of the Velsicol Corp., Chicago, Ill.

TIMELY INFORMATION on the habits and elimination of wood-destroying insects is contained in a folder on "Penta" Preservative. The title is, "Chemical Control Methods for Termites and Lyctus Beetles." The folder tells how these pests operate and presents evidence to show the effectiveness of "Penta" Preservative, (5 per cent pentachlorophenol in petroleum solvent.)

Copies of this bulletin 46-T may be had on request to the Chapman Chemical Co., 333 North Michigan Avenue, Chicago 1, Ill.

Robert Loveland

The association of Mr. Robert Loveland with the Kills 'Em Chemical Company, Limited, Honolulu, Hawaii, as Chief Chemist is announced by Benet Costa, general manager of the company.

Mr. Loveland is a well known specialist in the sanitary products and pest control field. For the past five years he has been supervising chemist in the world-famed naval laboratory at Pearl Harbor, where dozens of new war chemicals were perfected.

The Navy in 1945 selected Mr. Loveland for a 4-month experimental job at Washington, D. C., with visits to various naval establishments on the East Coast.

Mr. Loveland is a University of Hawaii graduate chemist, and one of the few such in Hawaii to specialize in sanitary chemistry.

Food Handlers Trained

New York City's Health Commissioner Isreal Weinstein opened a course in sanitation for institutional food handlers on March 22nd in connection with his campaign to clean up eating places and improve handling methods.

The course, to be given on Saturdays for fourteen weeks, began in the Fort Green Health Center, 295 Flatbush Avenue Extension, Brooklyn, under the auspices of the Catholic Charities of the diocese of Brooklyn, for persons in hospitals, homes and other institutions who supervise the handling of food.

Employees' Bulletin

A very unique Bulletin is put out every so often by Boracure (N.Z.) Ltd., Wellington, New Zealand, for their employees.

Information of value dealing with new methods, new chemicals, techniques and salesmanship are some of the interesting features outlined in this valuable Bulletin. Minute details in every phase of their service and work are brought to the attention of the employees.

It is the policy of the Boracure (N.Z.) Ltd. to keep their organization well informed regarding what is going on in the Pest Control Industry. Even contests are conducted for the benefit of their employees. The firm is operated by Jack Crowe. Best wishes, Jack.

Rabbit Bites Bug

Researchers at the South African Institute for Medical Research, according to Science Illustrated, put some of the new British-developed insecticide Gammexane in jelly cubes and fed these to a rabbit every morning. After the second day, yellow-fever mosquitoes were allowed to bite the rabbit and feed on its blood. Within 24 hours all the mosquitoes were dead.

In similar experiments, bedbugs were found to be tougher than the mosquitoes, but they couldn't survive a steady diet of poisoned blood. The treated rabbit appeared to be deadly to ticks, too.

American Cyanamid Merges Insecticide Department With Agricultural Chemicals Division

To fully co-ordinate American Cyanamid Co. activities in the Agricultural field, the Insecticide Department and the Agricultural Chemicals Division have been merged.

Better Rat Trap?

One of the announcers on the radio interviewing a cheese saleman said they had a new cat at their house that ate Limburger cheese and all she had to do was to blow her breath down a rat hole and wait for the rats to come out. (Think that will affect our business? Or don't you?)

Mold and Mildew Control

One of the new and very interesting popularly-styled bulletins or could be called booklet just off the press, is the "Mold and Mildew Control for Industry and the Home." This booklet covers the subject of mildew control in storage rooms, in bakeries, some leather goods, fabrics, paint, ropes and books. Data is given on some of the useful fungicides. The author is S. S. Block of Engineering & Industrial Experiment Station, University of Florida, Gainesville, Fla. By writing to the above institution, you may obtain a copy.

Robert G. Brennan

Mount Vernon—Robert G. Brennan, employee of the Guarantee Exterminating Company and formerly for fifteen years with the Mount Vernon Trust Company, died April 10, in the Mount Vernon Hospital at the age of 42.

He leaves a widow, Mrs. Gertrude Jost Brennan, a son and a daughter, three brothers and a sister.

Our deepest sympathy to the family.

New Chemical Odorid

A product of modern chemical research developed for the specific purpose of eliminating offensive odors effectively, safely, and economically, is now available to the industry. On page 27 of this issue, the first in a series of proactions is to be run by the Odorid Products Co., of Cleveland, manufacturer of Odorid. It is stated that this odorizer can be used with complete freedom as it is non-poisonous and harmless to man and beast. It is non-caustic and non-toxic and will not damage fabrics, furnishings, or other material. It will not deteriorate with age and is effective when used either wet or dry.

It is also stated that heavy equipment such as sprayers, traps and trucks can now be rendered odor-free. The odious fumes caused by decomposition and putrefaction of carcasses are attracted and held to the surface particles of the material and actually destroyed.

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II. Plants as Housepests. Bacteria, Molds which live in the house. Timber rot, fungus. What plants do to housepests and what housepests do to plants and plant products. Pages: 62.

III. Lower Animals. Protozoa, worms, snails, millepedes, spiders, mites, many others, as far as they are housepests. Pages: 112.

V. Backboned Animals. Chordata, coldblooded and warmblooded. Rodents, rats and mice take 56 pages. Formulae, Index. Pages: 148.

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The New 1945

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By EDITOR-IN-CHIEF, H. BENNETT

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Volume VII of "The Chemical Formulary" includes thousands of the best and most practical formulae, compiled by authorities and experts in each field of industry. Each formula is new, and different from those in previous volumes.

Formulas for pest controls are extensive, and are the results of the most recent research. They include general and agricultural insecticides, parasiticides, larvicides, vermin exterminators, cattle grub control, Ant poison, mothproofing emulsions, fly control spray, Japanese beetle larvae control, lawn grub control, roach powder, silver fish poison, hide and skin beetle control, insect repellents, horticultural sprays, and Rotenone-Derris substitutes.

This valuable book describes and explains the latest commercial methods and processes. It will bring you valuable data and ideas that would otherwise be accessible only after consulting dozens of other books.

Substitutes

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A handbook of substitutes and alternatives for chemicals, fibres, metals and other commercial products including a plan for choosing proper substitutes. This book is the result of the author's wide knowledge of substitutes and alternatives for numerous products in diverse industrial fields.

CONTENTS: Substitute Requirements; Formulation; Proportions; Methods of Manufacture; Costs; Use of the Finished Product; Testing; List of Substitutes and Alternatives.

"How to Know the Insects"

A very valuable book for every pest control operator. This book, with its 140 pages and more than 250 careful drawings, is an excellent reference book for P.C.O.'s as well as for experienced entomologists.

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Spray Chemicals and Application Equipment

The new book "Spray Chemicals and Application Equipment" is the result of six years research and collection of data by Wayne B. Fisher, B.S.A., Purdue University, chemical sales representative, and commercial horticulturist, cooperating with Dr. J. A. McClintock, Professor of Horticulture, Purdue University (co-author).

The book "Spray Chemicals and Application Equipment" is divided into two parts. Part one gives the interesting historical background of many chemicals and detailed discussions and photographs showing now they are manufactured. In addition, much discussion is devoted to methods of using spray chemicals, to insects and diseases controlled by the specific chemicals, and to methods of improving present day pest control practices.

Part two is a complete discussion describing almost every type of sprayer and duster available to the public for use in applying spray chemicals. About 300 illustrations are included in this section, and all types of equipment is shown ranging from the simplest atomizer sprayer to the largest commercial sprayers and airplane dusting equipment.

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The extermination of vermin is a skilled proceeding requiring the employment of scientific methods and of persons possessing technical knowledge. This authoritative book will prove of definite and practical value for all who are interested in the control of insect pests and in the prevention of disease.

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PYRENONES*

- Good household insecticides can be made without Pyrenones but there is little point in trying to do so when it is so much simpler and more economical to make even better ones with Pyrenones.
- The supply of Pyrenones was not adequate in time to permit their general adoption for 1947 formulations but usage has been on a sufficiently broad scale to demonstrate that their effectiveness and safety exceed expectations.
- Pyrenones are now available in ample if not unlimited amounts. The next few months will set the pattern for 1948 use. There is time for thorough study and trial of the Pyrenones and their place in your present and future plans.

* Reg. U. S. Pat. Office

DODGE & OLCOTT, Inc. D&O

Insecticide Division: 60 EAST 42ND STREET, NEW YORK 17, NEW YORK

General Offices: 180 VARICK STREET, NEW YORK

Branches: BOSTON • CHICAGO • PHILADELPHIA • ST. LOUIS • LOS ANGELES

Plant and Laboratories: BAYONNE, NEW JERSEY

Canadian Agents: Standard Chemical Company Limited, 195 Eloat St. E., Toronto, Can.

The Vanderbilt Laboratory, East Norwalk, Conn.

ATTENTION MANUFACTURERS of Pest Control Powders

USE PYRAX ABB WITH DDT

PYRAX ABB is the best supporting medium to mix with DDT to eliminate fleas, lice and vermin. Information and sample on request.

R. T. VANDERBILT CO., Inc.

Specialties Dept.

230 Park Avenue · New York 17, N. Y.

WRITE FOR THESE BOOKLETS

IMPROVED PYRIN #20

This attractively gotten up brochure, illustrated, discusses, among other things, Improved Pyrin No. 20, what it is, principal characteristics, knockdown, kill, its use in mill and stock sprays, pyrin-DDT combinations, etc.

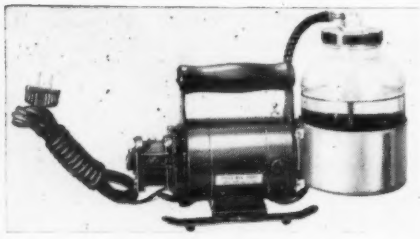
John Powell & Co., Dept. P., 1 Park Ave., New York 16, N. Y.

ODORLESS DEODORANT

"Odorid" a new odorless deodorant, it is stated, removes obnoxious odors effectively and may be used anywhere, anyplace, anytime. Literature also states it is non-caustic, non-corrosive, non-poisonous non-toxic, non-inflammable, no gaseous emissions, quick acting, not affected by heat or cold and economical to use.

Odorid Products Corp., Dept. P., Euclid Seventy-First Bldg., Cleveland 3, Ohio.

NEW ELECTRIC SPRAYER



Pest control work is made easier with the new PIEZO Electric Sprayer, according to a recent announcement by the company. Roaches, bedbugs, and other insects lurking in crevices behind sinks, pipes, baseboards and mouldings can be destroyed more effectively because of the penetrating power behind the spray. Mosquitoes, flies, gnats, moths and other pests are completely eliminated by its complete coverage, it is stated. This Sprayer, type ES-2, is properly balanced for easy handling. It is small in size, comparatively light in weight and does not vibrate while operating, it is also stated. The form-fit handle enables the operator to use the sprayer without tiring. The On-Off switch starts and stops the motor with the same hand that is carrying the unit.

It is powered by an ¼ h. p. motor AC or DC. The compressor furnishes compressed air which atomizes the insecticide into a fine mist. The high speed velocity of the compressed air drives the mist into every crevice and crack, insuring complete penetration of infested areas.

The two-position nozzle permits the spray to be directed straight ahead or upward towards the ceiling while holding in a natural horizontal position. The high capacity of compressed air gives ample volume for all over coverage of large rooms.

The compressor unit is made of cast iron, well known for its wearing qualities. The air is filtered as it enters the pump, protecting the entire sprayer from dirt or grit. To operate pour any standard spraying liquid, including DDT, into the 27-ounce jar and turn on the switch. This is sufficient for 32 minutes of spray operation.

The liquid container fits snugly into the mounting bracket and prevents any liquid from dripping on floors, furniture or rugs.

It is sturdily constructed, well engineered, of excellent workmanship and durable materials.

This type ES-2 PIEZO Electric Sprayer is now ready for distribution by the Piezo Manufacturing Corporation, Dept. P., 110 East 42nd Street New York 17, New York.

INSECTICIDES

Insecticides. 8-page bulletin on fully automatic blending systems for "More Effective Insecticides," with photographs of comparative tests on well-known types. **Bulletin 1-846.** Sprout-Waldron & Co., Muncy, Pa.

ODORS

Odors. 11-page booklet on "Problems of Odors in Institutions" describing methods and materials available to combat them. Hospital Bureau of Standards and Supplies, Inc., 247 Park Ave., New York 17, N. Y.

MAGNIFIERS

Literature lists and illustrates comprehensive tests on well-known types. **Bulletin 1-** magnifiers of invaluable assistance to every PCO in his daily activities.

Schoenig & Company, Dept. P, 8 East 42nd Street, New York 17, N. Y.

RODENT ATTRACTANT

Extracted Peanut Product which, producer states, is the type of article used by many exterminators in sities for attracting rodents and getting them into traps. Producer further states the peanut product will not freeze, dry up or lose its strength, which means that when exposed to the air it remains pungent and aromatic for a long period. Peanut butter, on the other hand, it is stated, has the disadvantage that it freezes solid and is almost impossible to use in winter, because when it solidifies, its scent properties are very much cut down.

Sparhawk Co., Sparkill, N. Y.

NEW MSA FULFACE DUST MASK FOR ALL-OVER HEAD PROTECTION AGAINST DUSTS

The new MSA Fulface Dust Mask, it is stated, combines complete facial and respiratory protection against dusts - without obstructing vision, and is made by Mine Safety Appliances Company. Comfort and safety where nuisance or harmful dusts affect the eyes as well as the respiratory system are assured by the gas-tight seal of the MSA Fulface Mask and its replaceable filters.

Lightweight and flexible, yet durably constructed, the Fulface Mask covers the entire face, conforming snugly to facial contours. Head bands are easily and quickly adjustable.

Twin large-area throw away filters remove dusts efficiently yet offer very low breathing resistance. Inexpensive and easily replaceable, the filters are encased in durable, lightweight aluminum containers which are placed low at the sides of the Fulface Mask to permit unobstructed vision. A rubber exhalation valve, positive in action, provides breathing ease and quick drainage of moisture.

A large single clear plastic lens permits wide-angle vision to the wearer of the MSA Fulface Dust Mask. Rubber air deflectors direct incoming air over the inside surface of the lens, preventing fogging

For Bulletin No.CR-19 on the new Fulface Dust Mask write this publication or direct to Mine Safety Appliances Company, Braddock, Thomas, and Meade Streets, Pittsburgh 8, Pa.

METHYL BROMIDE

What it is: what it does: how to use it. Described are dosage schedule for various type pests, methods of application and preliminary precautionary measures.

WRITE WESTVACO CHEMICAL CO., Chrysler Bldg., N. Y. C.

Circular describes a new chemical which, it is claimed, will mothproof and flameproof at the same time. Circular also states that it is easy to apply, that a single application is good for the life of the fabric and that it is not affected by solvent cleaning. Laundered or steam-cleaned fabrics, however, require re-treatment. May be applied to carpets, rugs, upholstered furniture, drapes, clothing, mattresses, auto upholstery, linen, cotton, calico, veiling, rayon, velvet, jute, theatre scenery, etc. Flamort Chemical Co., Dept P., 746 Natoma Street, San Francisco 3, Calif.

Business Opportunities

(Classified)

RATES — For individuals seeking employment, 5c per word, minimum $1.00. All others 10c per word, minimum, $2.00. All advertisements must be in the hands of the publishers seven days before publication date and must be accompanied by cash or money order for payment in full. The publishers are not responsible for any false or misleading advertisements.

Replies to advertisements where box number only is indicated should be addressed c/o PESTS, 1200 Oak St., Kansas City 6, Mo., giving box number as well.

PEST CONTROL BUSINESS

Located in city of 60,000. Wonderful year round climate. Owner must sell due to ill health. One man business now doing about $7,500 per year. Best known in city for 7 years. Wonderful opportunity if you know the business. Cash price, $6000. Write or wire Box 5, Pests.

For Sale: Well established pest control business. Termites and general pest control. Gross sales in 1946, $50,000.00 Good profit. Price, $30,000.000 including buildings, and inventory. Located in California. Box 9 Pests.

DDT- THANITE INSECTICIDES

Large quantities Grade AA 5 gallon ICC steel drums. Quantity price 35c per gallon.

Cook Industries, Sales Division, 189-A Schaeffer Street, Brooklyn 7, N. Y.

THALLIUM SULPHATE

99⁺%

PROMPT SHIPMENT FROM STOCK

METAL TRADERS, INC.

67 Wall St., N. Y. 5

HOUCHIN'S INSECT POWDER DUSTERS

Made of Heavy Durable Metal Gold Lacquered

Capacity 2 oz. Powder

No. 999 "Cyclone"

Thos. W. Houchin Corp.

87-101 Ferry St. Jersey City 7, N. J.

WIDEN YOUR PEST CONTROL SERVICE WITH DOW FUMIGANTS

DOW COMPLETES YOUR BUSINESS PICTURE

Alert pest control operators who are experts in the use of all types of Dow fumigants are finding more and more opportunities for profitable business coming their way. The complete line of Dow fumigants—each designed to do a specific job and do it right—enables them to offer complete fumigation service with outstanding results.

DOW METHYL BROMIDE

With Methyl Bromide, foremost among food fumigants today, *you* can easily and quickly handle many new type jobs in the food fumigation field with your present staff and only the simplest equipment. It acts with impressive thoroughness in warehouses and other buildings, in vaults and box cars, and is effective for tarpaulin fumigations also. It penetrates even large storage stacks of bagged or packaged products—kills rodents and insects in every stage of development. It works faster—aerates sooner—cuts down total job time.

DOWFUME 75

Dowfume 75 (Ethylene Dichloride, 75% and Carbon Tetrachloride, 25%) is widely used as a grain fumigant.

DOW CHLOROPICRIN

Chloropicrin is the "tear gas" fumigant for stored grain, food products, food processing plants and rodent control. It is especially reliable for use in buildings that cannot be sealed tightly enough to confine other gases.

DOWFUME EB-15

Dowfume EB-15 is a new local mill machinery or spot fumigant to be used periodically as a supplementary pest control measure in connection with general space fumigation employing Methyl Bromide. It is highly toxic to all stored product pests.

These reputable Dow fumigants can substantially increase your opportunities for profitable fumigation services. Write our Fumigant Division for full information.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit
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DOW
CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE
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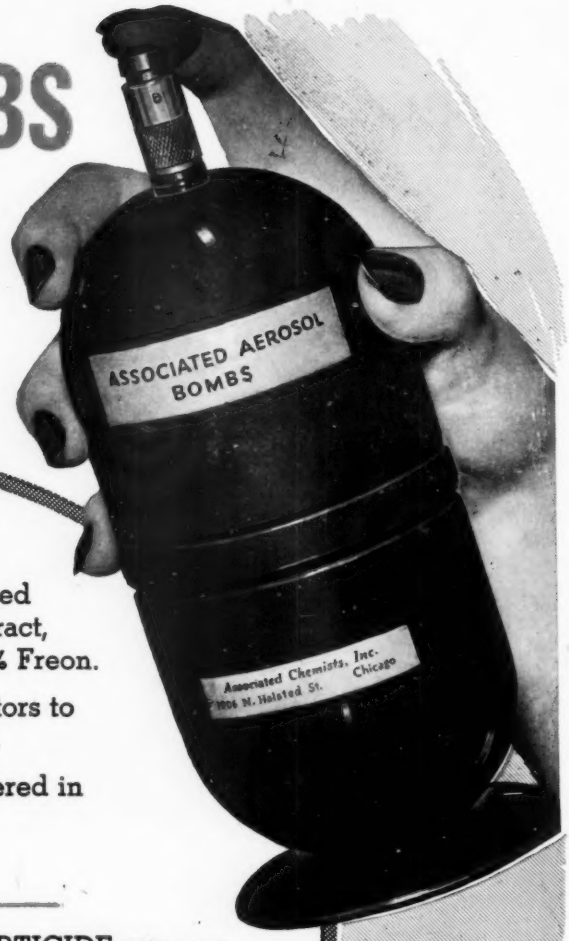
AEROSOL BOMBS FOR RESALE



Filled with Standard Approved Insecticide—2% Pyrethrum Extract, 3% D.D.T., 10% Solvents and 85% Freon.

At prices which will enable Distributors to handle the bombs at attractive profits.

Supplied with Distributor's label if ordered in sufficient quantities.

Packed 24 to a Shipping Carton.

HI-TOX, MORTICIDE and SUPER-MORTICIDE are now obtainable with D.D.T. added. NO INCREASE IN OUR PRICES.

D.D.T. Solutions containing from 5% to 50% D.D.T. Technical Grade.

D.D.T. Powders with 10% to 50% D.D.T. Technical Grade.

MORTOLIN—Concentrate for Moth-proofing Compounds.

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